

The Only Journal With a Paid Circulation in the Rock Products Industry

# Rock Products

Vol. XXIV, No. 23

CHICAGO

November 5, 1921

## EDITORIAL DEPARTMENT—

Nathan C. Rockwood, Editor  
Chas. A. Breskin,  
H. E. Hopkins,  
Associate Editors

## ADVERTISING STAFF—

Charles H. Fuller, Eastern Manager,  
101 West 41st Street, New York City

A. S. Barnett,  
Western Representative

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**POST-OFFICE ENTRY**—Entered as second-class matter, July 2, 1907, at the Chicago, Ill., Post-office, under the Act of March 3, 1879.

## ROCK PRODUCTS—

Geo. P. Miller, Manager  
E. M. Gibson, Assistant Manager

Published every other Saturday by

**TRADEPRESS PUBLISHING CORP.**  
542 South Dearborn Street, Chicago, Ill.

W. D. Callender, President.  
N. C. Rockwood, Vice-President.  
Geo. P. Miller, Treasurer.  
C. O. Nelson, Secretary.

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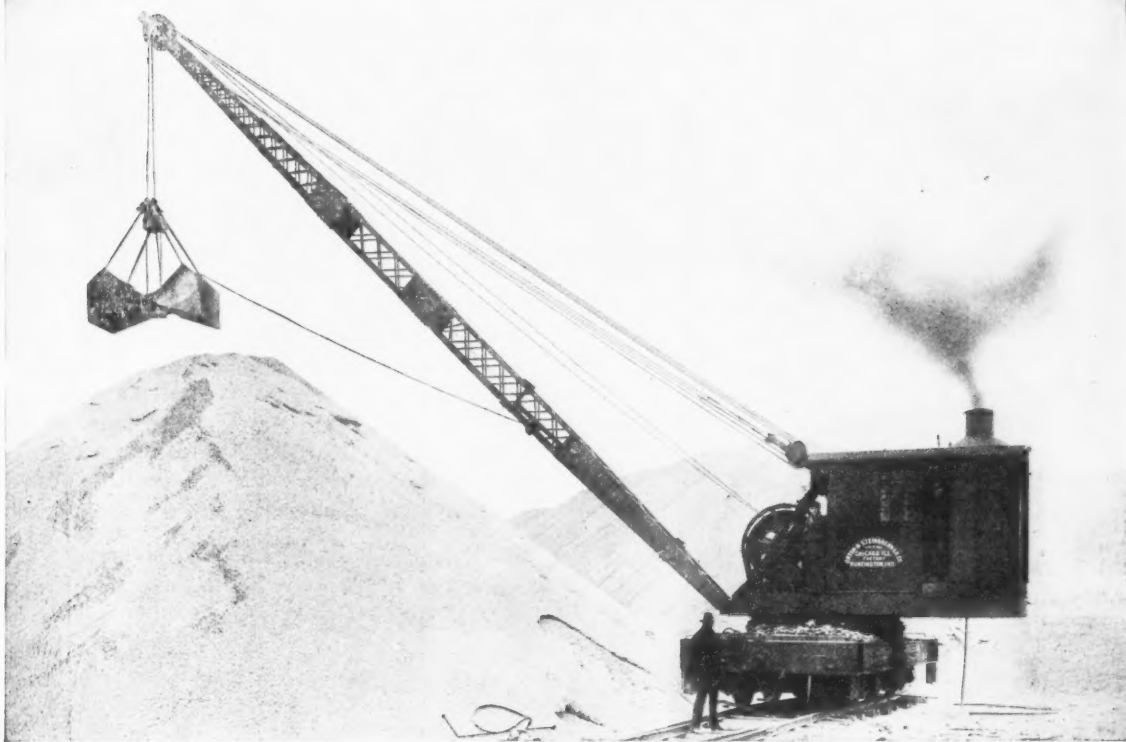
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30-TON CRANE  
With 60-ft. boom and 2-yd. bucket

## O. S. DEPENDABLE

**L**OOK at the problem squarely—Some day you will use O-S Dependable Cranes and Grab Buckets and forever after you will be a defender of their merits.

The material handling machinery made by Orton and Steinbrenner Co. are not "just suitable." They are unsurpassed for simplicity, accessibility and the quality of the material and workmanship insure a rare economy of performance.

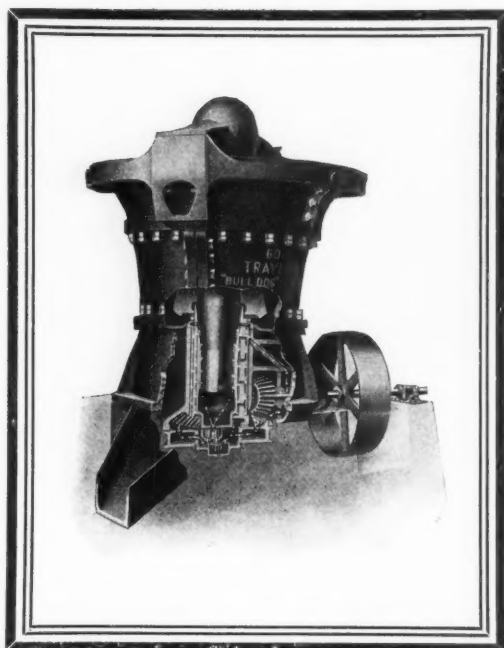
Our booklet on this subject is profusely illustrated with photos of our cranes on the job and contains a world of information concerning details that is far beyond the space limitations of this advertisement.

It will be sent to you on request

**Orton & Steinbrenner Company**  
**CHICAGO**

Factory—Huntington, Ind.

*When writing advertisers please mention ROCK PRODUCTS*



## Where Others are Weak the "Bulldog" is Strong

Traylor "Bulldog" Crushers are exceptional in value largely because of the exclusive features noted in the panel to the left. But aside from these features, the materials we use, and the careful attention to details of manufacture have a bearing on the service value of this machine that demands your attention.

Bulletin RGX-1 will tell you the complete story and it will be sent to you on request.

### *Exclusive Features*

Hewes Spider, the Lightest  
and Strongest Spider Known



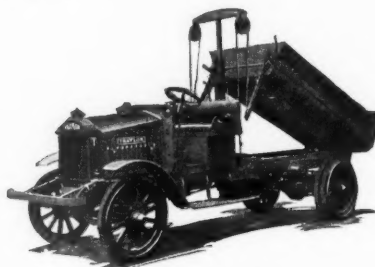
Positive Forced Feed Lubri-  
cation by Submerged Gear  
Pump



Cut Steel Gears That Run  
in a Continual Bath of Oil



Self-Aligning Eccentric  
Journal Bearing



## Traylor Trucks

This organization, with all its knowledge and experience concerning the needs and necessities of the rock products industry stands back of every truck shipped from this plant. They have demonstrated their worth in hundreds of cases—giving more than satisfaction and the praise we have received from owners is tinged with enthusiasm.

### Traylor Engineering & Manufacturing Co.

ALLENTOWN, PENNSYLVANIA

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Chicago  
1414 Fisher Bldg.

Los Angeles  
Citizens Bank Bldg.

Spokane  
Mohawk Block





**Since 1839**

*what the name Grasselli  
has meant to explosives*

'W<sup>AY</sup> back in 1839, when prairie schooners wended their way across untracked prairies, Grasselli was making the basic chemicals used in explosives.

That's a pretty long time—more than three quarters of a century. And it is natural that with all the knowledge and experience gained down

through the years, Grasselli should make—Grasselli Explosives.

One of our field service men will gladly serve you in helping meet your explosive needs with good Grasselli explosives and practical suggestions.

Will you write our nearest branch?

**The Grasselli Powder Company**

Main Office: Cleveland, Ohio

Philadelphia  
Pittsburgh  
Chicago, Ill.  
Cumberland,  
Md.



Wilkes-Barre  
Pottsville, Pa.  
Uniontown, Pa.  
Clarksburg and  
Bluefield, W. Va.

# GRASSELLI EXPLOSIVES

*When writing advertisers please mention ROCK PRODUCTS*



## Why not Mechanically?

"It's costing us too much out there—we must look into the savings of JEFFREY LOADERS."

"A great thought, Peterson, they should cut our loading costs."

"Unquestionably, Mr. Edwards. Jeffrey Loaders are powerful self-feeding machines that will do the work of 5 to 10 men and quicker, with less supervision and at less cost. They dig 10 feet into the pile. The Type 'G' Loader has a capacity of  $1\frac{1}{2}$  to 2 cubic yards per minute, the Type 'K' 1 cubic yard.

"I'll send the boy in with the catalogs I received yesterday and we'll take the matter up as soon as you have looked them over."

WRITE FOR IT! Catalog No. 288-N on Type G or No. 309-H on Type K—or both. No obligations

Shipment from Stock  
At Reduced Prices

### The Jeffrey Manufacturing Co.

935 North Fourth Street, Columbus, Ohio

New York	Buffalo	Denver	Montreal	Detroit	Middlesboro, Ky.
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# JEFFREY

## MATERIAL HANDLING MACHINERY

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## A HYDRATED LIME PLANT PRODUCING 24 TONS AN HOUR OF CHEMICAL LIME

THE AMERICAN LIME AND STONE CO. HAVE COMPLETED AND PUT INTO OPERATION THEIR NEW LIME PLANT AT BELLEFONTE, PA., WHERE THEY WILL PRODUCE A HIGH QUALITY CHEMICAL LIME.

Two Raymond Pulverizers equipped with Air-Separation are installed in the Hydrate Department for finishing the lime between the Schaffer Hydrator and the Bates Valve Bagging machines. These two produce between 20 and 24 tons per hour capacity, giving an extremely fine, uniform material.

In the handling of Hydrate, Raymond equipment performs three distinct operations. The first is disintegrating of the Lime and freeing it from the impurities; the second is a separation of the impurities such as core, sand and unburnt lime; and the third is Air-Separation of finished material for uniformity and delivery of this material to a suitably located storage bin from which it can be drawn off and bagged.

The handling of a great many materials requires one or more of these operations and Raymond Mills with Air-Separation are the only equipments which accomplish results with one complete unit.

For economical results use the Raymond System for reducing your materials to a powder.

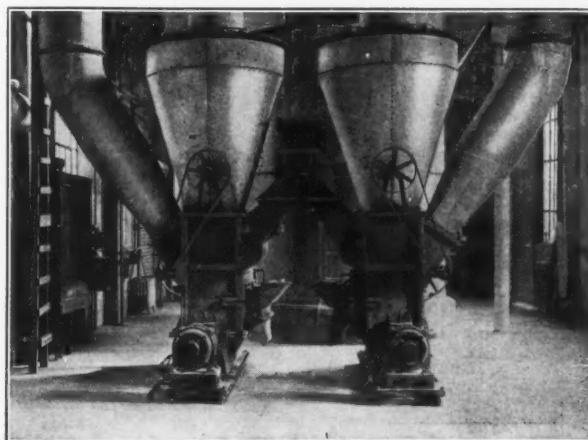
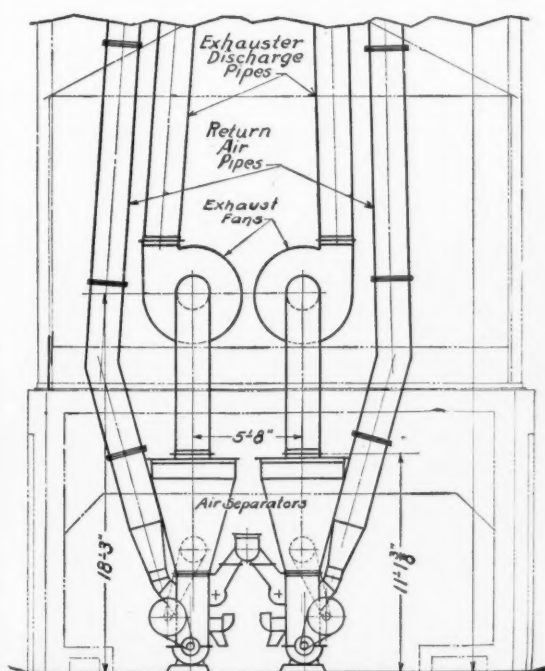
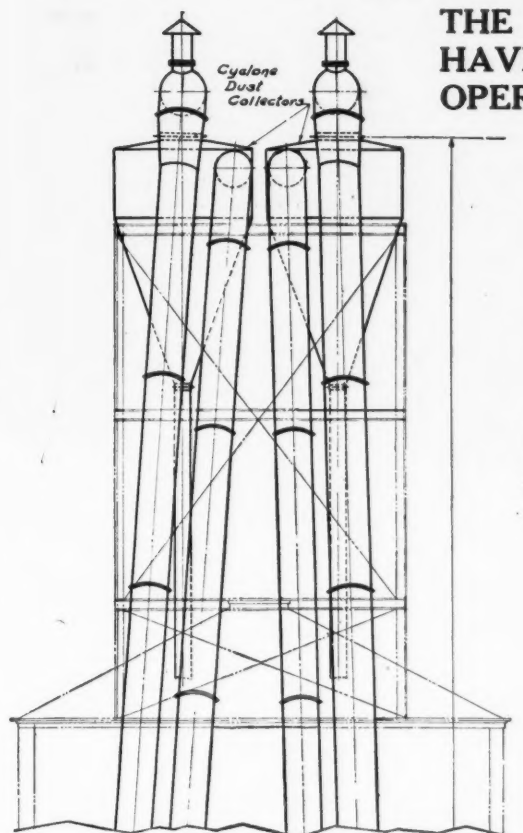
### Raymond & Bros. Impact Pulverizer Co.

1301 North Branch Street

Chicago, Ill.

Western Office: 201 Boston Bldg., Denver, Colo.

Eastern Office: 50 Church St., New York City



When writing advertisers please mention ROCK PRODUCTS



## World's Largest Lime Plant is Vulcan Equipped

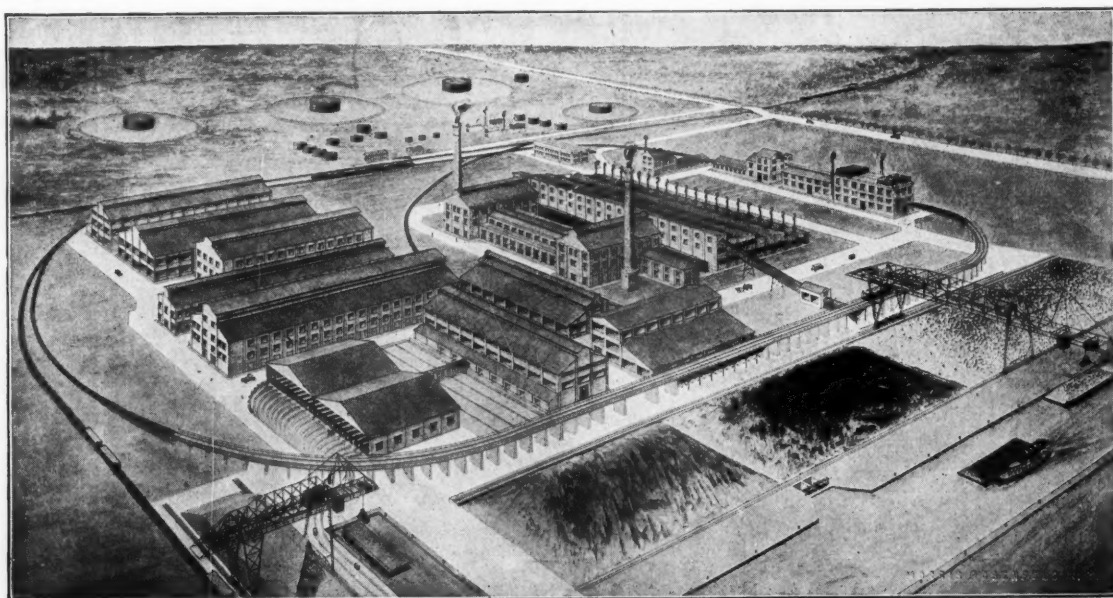
**T**HE new potash plant of the Eastern Potash Corporation, near New Brunswick, N. J., is equipped with ten 8 x 125 ft. oil fired VULCAN KILNS.

In an industry where the possibilities are practically unlimited, the best possible equipment is naturally desired. The thorough knowledge of VULCAN engineers and the thoroughness of VULCAN workmanship inspires the confidence of those who desire the best.

### VULCAN IRON WORKS

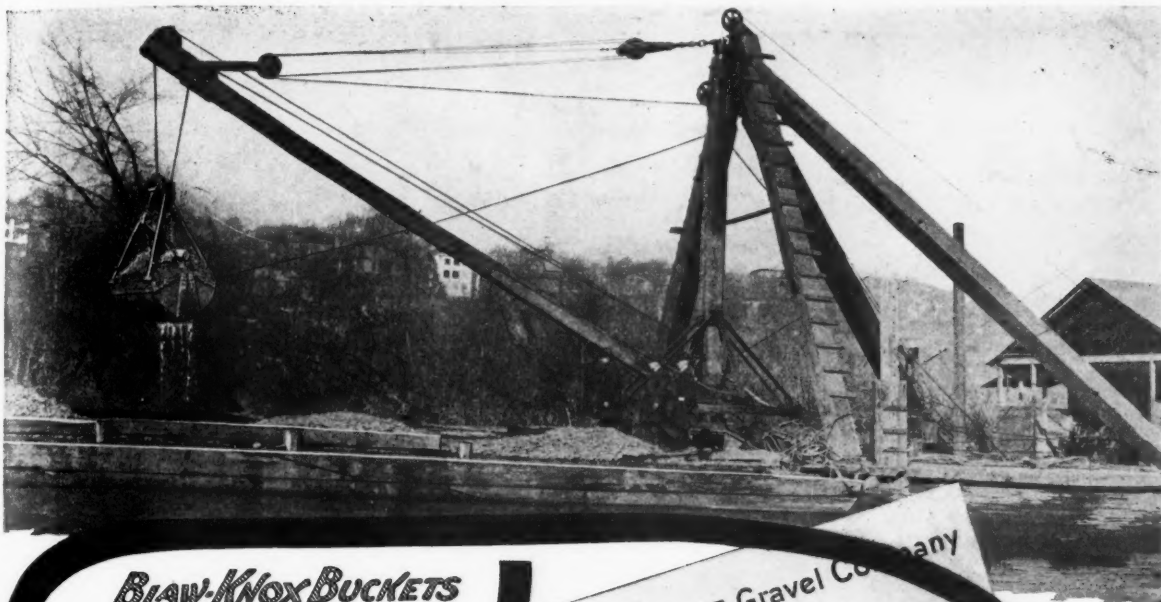
*Established 1849*

1753 Main Street Wilkes-Barre, Pa.

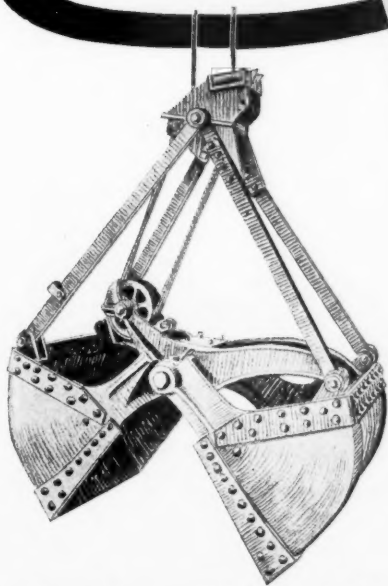


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**BLAW-KNOX BUCKETS  
ARE WELL THOUGHT  
OF HERE**



### Dredging—Digging—Handling

Unstinted praise from users of Blaw-Knox Buckets is testimonial to their unparalleled efficiency on all dredging, digging and rehandling jobs.

Your cranes should be Blaw-Knox equipped.

Kinzel-Thompson Sand & Gravel Company  
SAND GRAVEL LIME CEMENT  
SERVICE FIRST  
KNOXVILLE, TENN.

May 30th, 1921.

Blaw Knox Co.,  
Pittsburg, Pa.

Gentlemen:-

Replying to your communication of May 27th, regarding the service we are obtaining from your buckets.

In this connection allow us to state that we are operating two Bull Dog Type of buckets and one Dreadnaught Bucket. The Dreadnaught Bucket is being operated in discharging material from gravel, which runs from bowlders of 16" down to sand, in size. The bucket is giving us very satisfactory results, in fact, it is giving us better service for this character of work than any bucket we have ever here-  
before used.

Yours very truly,

*Fred L. Gomer*  
Vice President & General Mgr.

FIG/V.

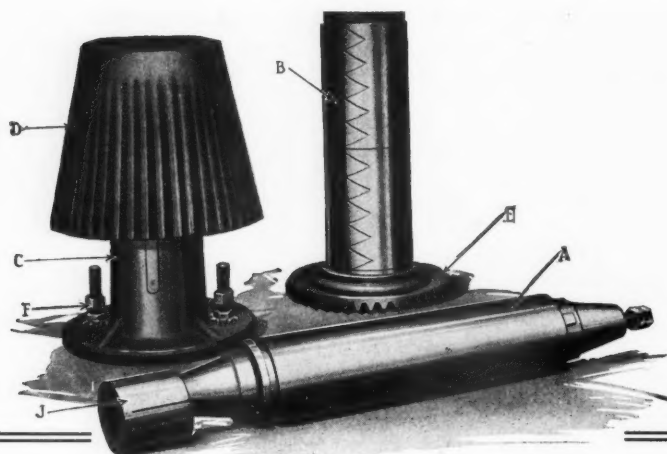
Blaw-Knox Buckets are made in all sizes—single line, two line, three line or four line.

# BLAW KNOX

PITTSBURGH, PA.  
619 Farmers Bank Bldg.

COMPANY

New York-Boston-Chicago-Detroit-Kansas City  
Baltimore-Birmingham-San Francisco



## HOW TELSMITH WORKS

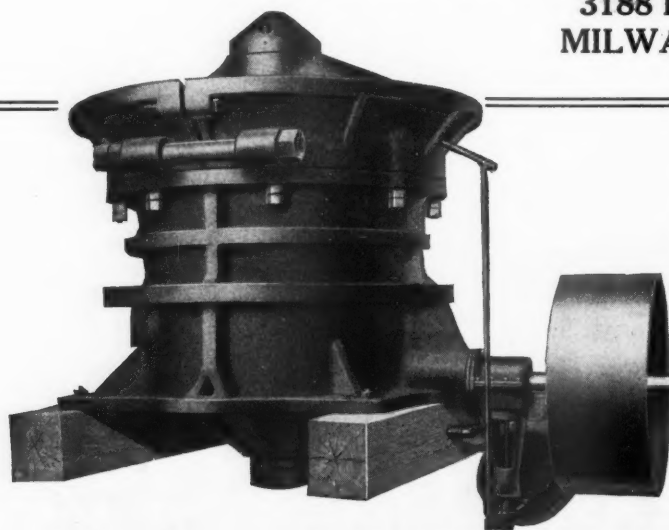
The parts shown above are the principal "insides" of the Tel Smith Primary Breaker. A is the shaft, a huge, forged steel bolt—*rigid*, not rotary or gyratory. B is the eccentric which turns about the shaft, being driven by gear E and a pinion which is not shown. C is the flanged head-liner and D is the head, adjusted by means of jack-screws F. The eccentric rotates inside the head; but neither head nor head-liner is rotated. They *gyrate* together—slide horizontally. This movement, equal at top and bottom of the head, is most effective for coarse crushing. The big chunks are pinched the minute they enter the bowl. There is very little slippage, even with smooth, hard river boulders.

It sums up to this: the big rock needs the maximum crushing stroke. Tel Smith applies that long, horizontal pinch right at the strategic point. That's why Tel Smith takes bigger rock and crushes more of it.

There are other features of Tel Smith design that are just as interesting as the "parallel pinch"—for instance, the short, heavy structure, the massive, low-arched crown, the unbreakable shaft, the enormous crushing areas, the force-feed oiling system, the free bottom discharge. All these things are fully described in catalog No. 166 (Tel Smith Primary Breaker) and bulletin No. 2-F-11 (Tel Smith Reduction Crusher). Write for them.

## SMITH ENGINEERING WORKS

3188 Locust Street  
MILWAUKEE, WIS.



Old Colony Bldg.,  
Chicago, Ill.  
50 Church St.,  
New York City  
806 Otis Bldg.,  
Philadelphia, Pa.  
261 Franklin St.,  
Boston, Mass.  
110 W. Park Way,  
Pittsburgh, Pa.  
325 W. Main St.,  
Louisville, Ky.  
6110 Euclid Ave.,  
Cleveland, Ohio.  
Brunson Bldg.,  
Columbus, Ohio.  
Franklin and Channing  
Aves., St. Louis, Mo.

2540 University Ave.,  
St. Paul, Minn.  
207 W. Third St.,  
Des Moines, Ia.  
Bowman Mch. Co.,  
Omaha, Nebr.  
625 Market St.,  
San Francisco, Calif.  
Salt Lake Hardware  
Co.,  
Salt Lake City, Utah  
Road Builders' Equip-  
ment Co.,  
Portland, Ore.  
Canadian  
Representatives:  
Canadian Ingersoll  
Rand Co., Montreal,  
P. Q.

When writing advertisers please mention ROCK PRODUCTS

# SHOPE BULLETIN

VOL. I

November 5, 1921

Number 5

## Slag as An Aggregate

The Birmingham Slag Co. of Birmingham, Ala., is probably the first in the field to manufacture concrete brick with slag as an aggregate. The slag used in this instance is No. 7 "Ensley Basic Slag"  $\frac{1}{4}$ " to dust in size and under the Shope Patented Process the Company is not only turning out brick, but face and mantle brick that can compare favorably with clay and shaleface brick of any and every quality.

Only 20 men, including the loading crew, are required at this plant for the production of 30,000 bricks per day. Shope Brick is beautiful in color and texture. They are strong, waterproof, fireproof, permanent in color, square, true in line, regular in size and become stronger with age.

Here is an opportunity to turn your waste piles into a paying business with an absolute monopoly in your territory. Success is quick and certain.



General view of plant, loading side, Birmingham Slag Company

Write for complete information

## Shope Brick Company

361 East Morrison Street

Portland, Oregon

### LICENSEES:

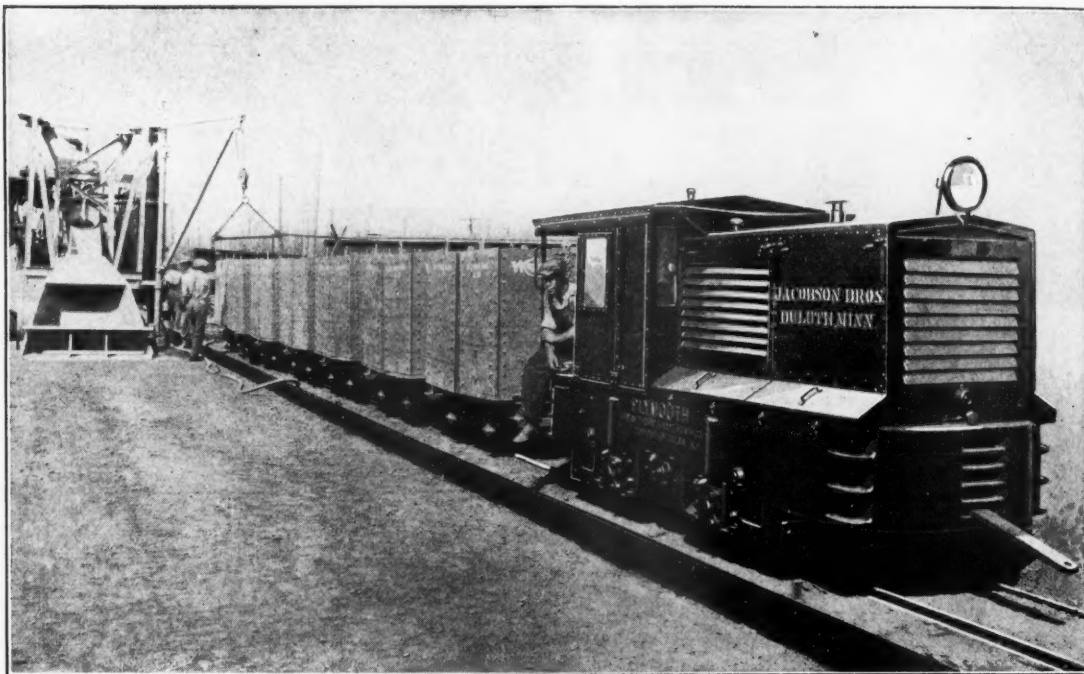
The Miles Co. .... Salem, Ore.  
Eugene Concrete Co. .... Eugene, Ore.  
Wastenburg Brick Co. .... Klamath Falls, Ore.  
Arizona Shope Concrete Brick Co. .... Phoenix, Ariz.  
W. B. Coarsey ..... Tampa, Fla.  
Texas Shope Brick Co. .... 3056 Sumpter Bldg., Dallas, Tex.  
Birmingham Slag Co. .... Birmingham, Ala.  
Shope Brick Co. of Wisconsin .....  
..... 50th and State Sts., Milwaukee, Wis.  
Dark Canyon Stone Co., H. W. Jones, Mgr., Rapid City, S. D.

The Polychrome Cement Brick & Tile Co. ....  
..... Carter-Cotton Bldg., Vancouver, B. C.  
Warren Sand & Gravel Co. .... Easton, Pa.  
Penn Shope Brick Co. .... Reading, Pa.  
Lycoming Shope Brick Co. .... Williamsport, Pa.  
Shope Brick Co. .... Portland, Ore.  
Rustic Brick & Supply Co., Palette Rd., Ford City, Ont., Can.  
Puyallup Shope Brick Co. .... Puyallup, Wash.  
Utah Shope Brick Co., P. O. Box 632, Salt Lake City, Utah  
Decoration Brick Co. .... 1565 N. Lake Ave., Seattle, Wash.

These licensees are all successful manufacturers



## PLYMOUTH



Plymouth Locomotives in Equipment of Jacobson Bros., Twig, Minn.

### Four Plymouth Locomotives Take Haulage Burden

Ultimately the Range cities of northern Minnesota will be linked with the lake port, Duluth, a distance of nearly eighty-five miles.

At Twig, Minnesota, Jacobson Brothers are at work on a section of the Miller Trunk Highway, using four PLYMOUTH Gasoline Locomotives, delivering materials for cement construction 18 ft. in width.

Mr. Shepherd is in charge, and the best testimonial for the work of the PLYMOUTH is the fact that two additional PLYMOUTHs have been added since the performance view above was snapped in August.

The PLYMOUTH Gasoline Locomotive has become almost universal in the field of industrial haulage. Ask for performance bulletins.

THE FATE-ROOT-HEATH CO.

PLYMOUTH, OHIO

# PLYMOUTH

*Gasoline Locomotives*



# Rock Products

Vol. XXIV

Chicago, November 5, 1921

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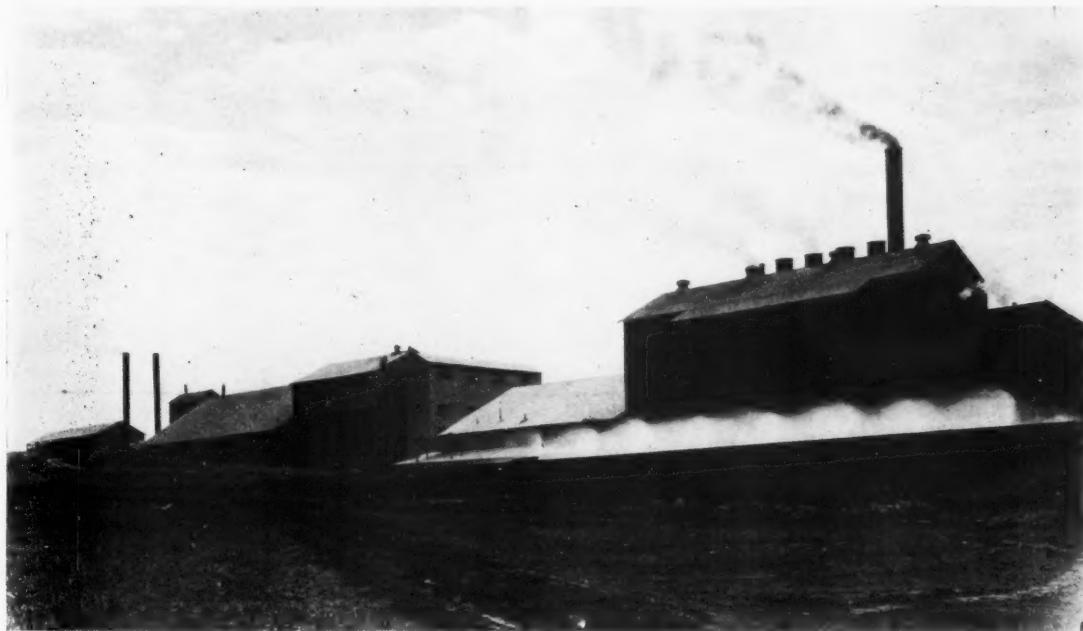
## Waste Heat Installation at Cement Plant

**Trinity Portland Cement Company, Dallas, Texas, Erects Waste Heat Power Plant  
at Cost of Over Half a Million Dollars—Entire Plant Run by  
Waste Heat from Kilns**

**H**ARNESSING ENOUGH WASTE HEAT from its kilns to operate practically its entire plant at Eagle Ford, a few miles west of Dallas, Texas, is the

that the waste heat had already developed 2700 k.w. The plant has five kilns, 8 ft. x 125 ft., oil fired, with a capacity of 3,000 bbls. of cement per day.

number of years, but gradually the price of gas went soaring to a point where its use was prohibitive. Also, the domestic consumption of gas in the city of Dallas



View of power house (spray pond in foreground), kiln building and storage building

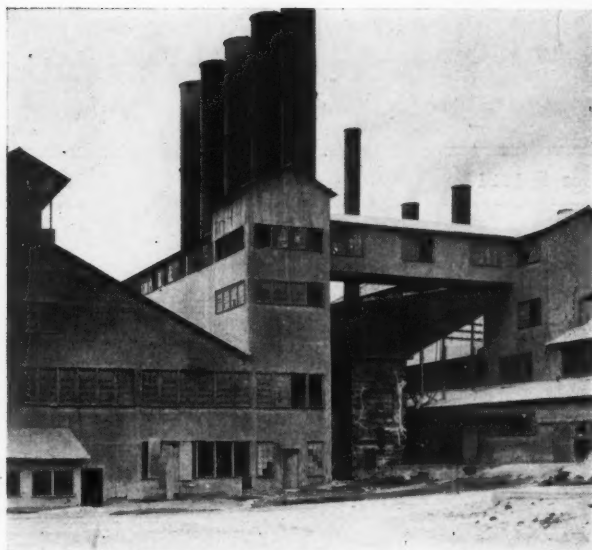
recent accomplishment of the Trinity Portland Cement Co. This company operates under the dry process and the heat from the kilns had been going to waste during the entirety of its operation and the move to save it was not made until the price of gas, which the company used for fuel, became prohibitive. It takes around 3,000 k.w. to operate this plant at full capacity. During the time of the writer's visit the plant had not been tested to the limit, owing to the lack of proper equipment, but the records then showed

### Old Power Plant

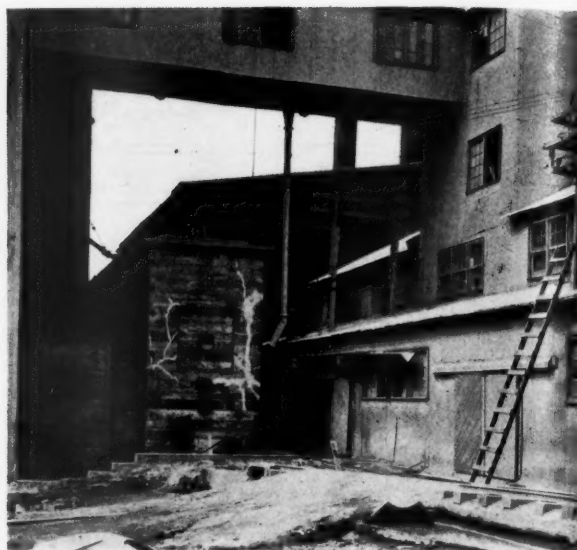
The cost of the new waste heat installation was approximately \$500,000 not to mention the junking of the old power plant representing a cost of \$300,000. The old power plant consisted of three gas engines direct connected to three 750 k.v.a. alternators. The engines first ran on producer gas, but when the Lone Star Gas Co. ran a pipe line through the company's property, the engines were converted to run on natural gas. The gas power worked very satisfactory for a

grew and finally the Lone Star Gas Co. notified the Trinity Portland Cement Co. that it could have no gas at all, thus leaving it without any immediate supply of power.

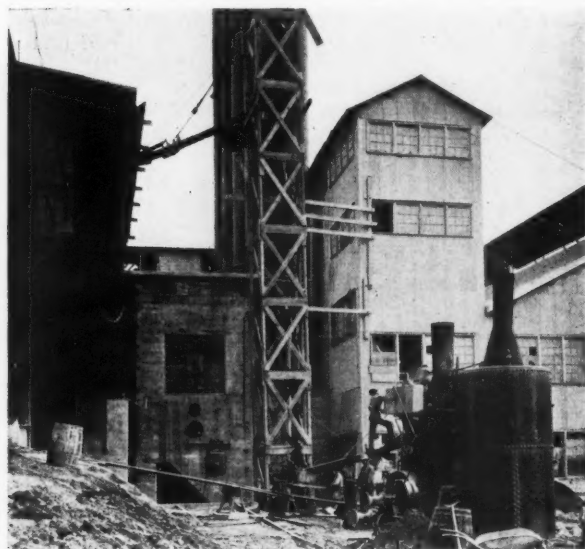
C. E. Ulrichson, general manager of the Trinity Portland Cement Co., anticipated this condition and as a result of his foresight the company decided to build a steam power plant to utilize the waste heat gases from the kilns. A. F. Miller of Jackson, Mich., was retained by the company as consulting engineer



Kiln building—Waste heat gas flue to right



Waste heat gas flue



Waste heat gas flue showing tunnel; construction view



Tunnel underneath flue, showing enclosed screw conveyor for removing dust

and plans began to get under way. The result was that in May, 1920, the company purchased a complete power plant. This was acquired from a Philadelphia power plant that was for sale, along with the buildings that housed it. It did not include the waste heat boilers, however.

#### Turbines and Condensers

The power plant consists of two 2500 k.w. Curtis vertical turbines direct connected to two surface condensers, 6750 sq. ft. in area. The surface condensers are sufficient in size to take care of a 50 per cent overload on the turbines. Each unit is served by a steam driven reciprocating dry vacuum pump and a two-stage, motor-driven, centrifugal hot-well pump. Also, each unit has sufficient capacity to carry the mill load. Such an

arrangement permits one unit to be down at all times and insures continuity in operation.

The circulating water for the condensers is provided by two 20-in. single stage centrifugal steam driven pumps capable of handling 6000 gal. of water per minute. The pumps run at 300 r.p.m., one being used as a service pump and the other as a stand-by. The water is pumped through 20-in. cast iron pipe lines to the condenser and the overflow from the condenser is also returned through 20-in. pipe lines.

The turbines are connected to two generators wound for 600 v., 25 cycle, 3 phase alternating current. Each generator is equipped with synchronizing devices controlled from the switchboard, so that the operator at the switch can make the nec-

essary manipulations to bring the machines in step.

#### Excitation Sets

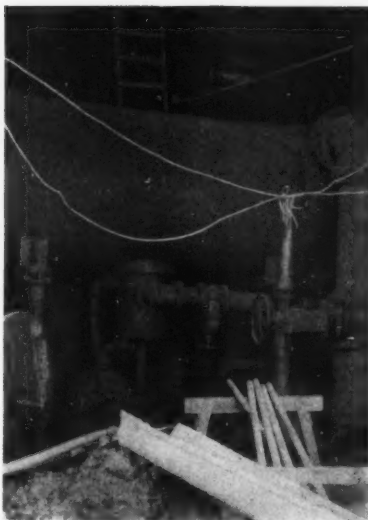
The excitation for the generators is furnished by a 75 k.w. steam turbine driven unit which generates 125 v., direct current. A 75 k.w. synchronous motor driven exciter set is located on the switchboard gallery and is used only after the generators are in operation. Steam is used first for excitation and after the turbines are in operation the motor driven exciter is used. A 150 k.w. motor generator is also provided to supply direct current for illuminating purposes.

The switchboard gallery is located 15 ft. above the power house floor line and is fitted with generator and distributor panels of the latest type. All switches

are of the oil switch type operated by magnetic control from the switchboard. The switchboard is fitted with such measuring instruments as curve drawing wattmeters, power factor meters, voltmeters, ammeters, etc.

#### Headers

The steam is supplied to the turbines at 195 lb. pressure and 100 deg. superheat. All auxiliaries with the exception of the boiler feed pumps are operated by steam supplied from an auxiliary header carrying steam at 125 lb. pressure and 100 deg. superheat. The reduction in pressure between the main header and the auxiliary header is brought about by a reducing valve. The main header is 10 in. in diameter and the auxiliary header 6 in. in diameter. All the valves and fittings in the main header are cast steel trimmed with Monel metal, capable of withstanding a total temperature of 750 deg. The fittings

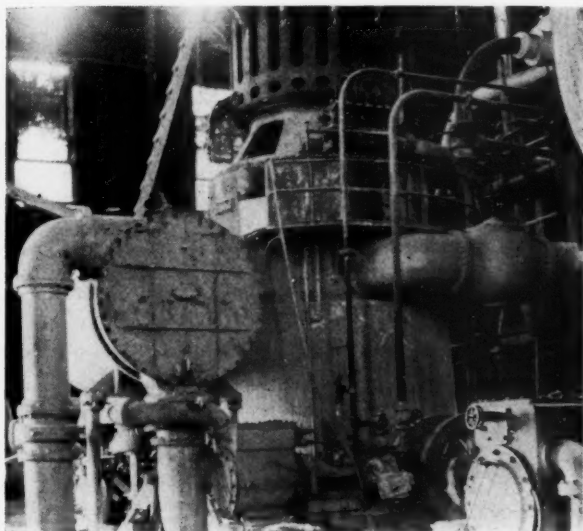


View of surface condenser

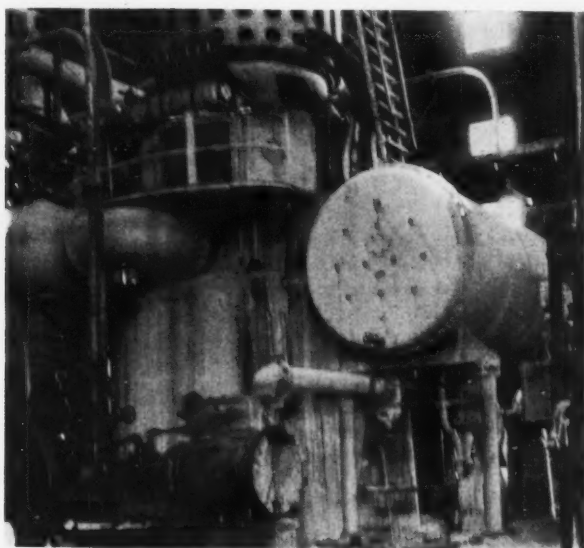
in the auxiliary header are of extra heavy cast iron.

#### Boilers

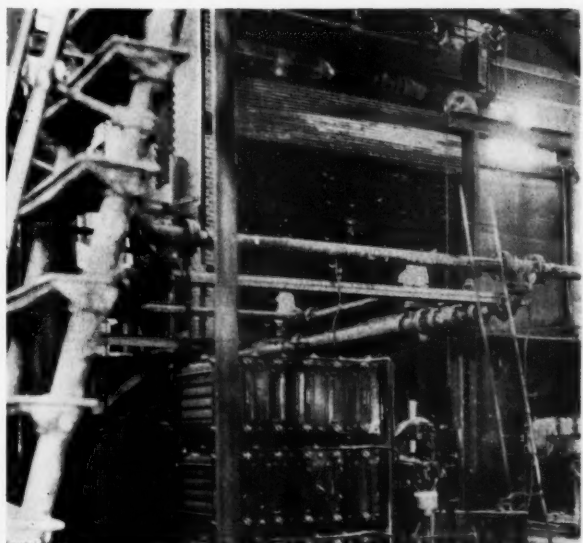
There are three boilers for generating steam, two waste heat and one direct fired. A 7-in. steam line leads from each boiler to the main header. The waste heat boilers are of the Edgemoor type, 1080 h.p. each. The direct fired or auxiliary boiler is also of the Edgemoor type 600 h.p. direct oil fired. The boilers are also equipped with Foster superheaters and to complete the waste heat unit the boilers are equipped with Green economizers and Green radial flow fans. The purpose of the economizer is to heat the feed water to a high temperature, before it enters the boiler, by means of the heat contained in the flue gases when they leave the boiler. The rise in feed water temperature thus gained from heat which would otherwise be wasted results in a



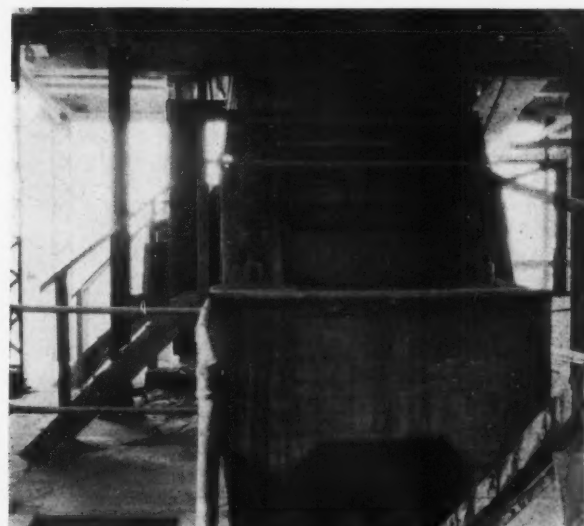
Curtis turbine and connections to condenser



Another view of turbine and connections



One of the waste heat boilers



Fairmount roll crusher showing hopper underneath





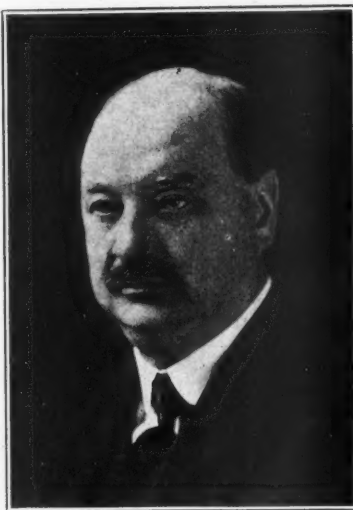
Trestle to crushing plant

greater evaporation in the boiler, per pound of fuel used. The radial flow fans furnish the induced draft and are driven by 150 h.p. variable speed motors, direct connected. The waste heat boiler settings are built up with red brick, insulated with "Sil-O-Cel" and lined with fire-brick.

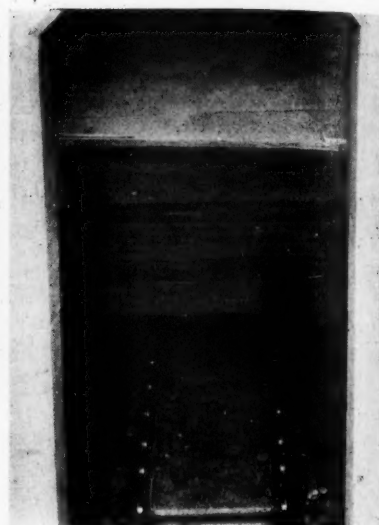
#### Boiler House

The equipment in the boiler house consists of two boiler feed pumps of the three stage De Laval turbo type. Each pump is capable of taking care of 3000 b.h.p. and one is a service pump, while the other is a stand-by. The De Laval pump water against a 210 lb. pressure head. Two additional De Laval two stage turbo pumps are provided for supplying fresh water and whatever makeup water is required in the boiler house.

An open type hot water heater of 2500 b.h.p. receives the condensate from the



C. E. Ulrichson, general manager, Trinity Portland Cement Co., Dallas, Texas

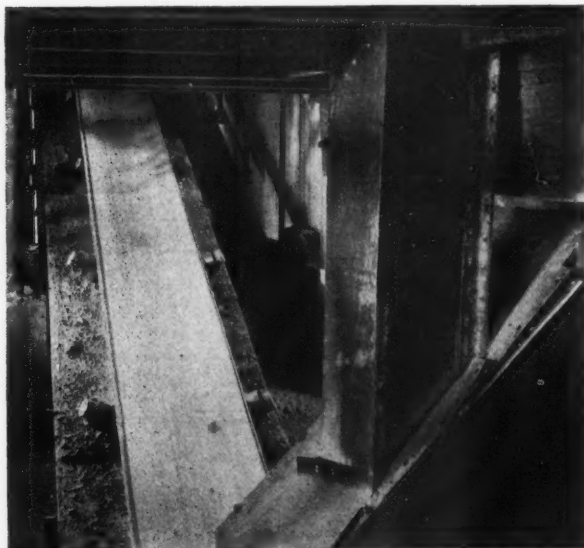


Concrete hopper underneath crusher; pan conveyor

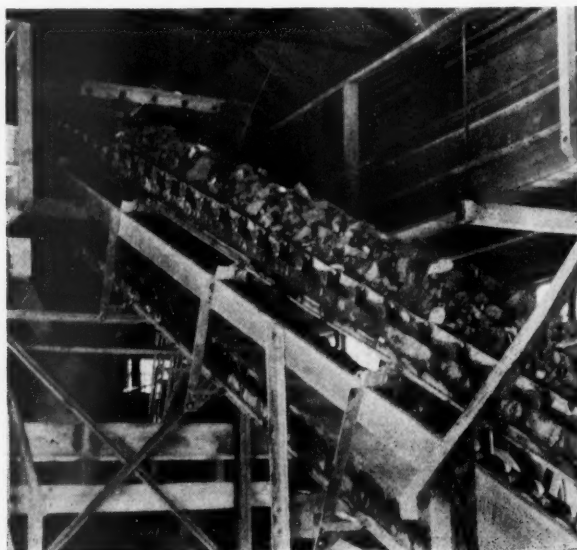
condensers. The makeup water is supplied by the two stage De Laval Turbo pumps. From here the water is pumped direct to the boilers by the boiler feed pumps. The boiler room is also equipped with an underwriters' fire pump which is used in case of emergency only and also for fire protection. To complete the equipment is an 8 in., 2 stage motor driven centrifugal pump which supplies water to all departments outside of the boiler house.

#### Waste Heat Flue

The flue for the waste heat is located between the kiln building and the boiler house. The flue connects with each kiln housing. Vertical dampers are arranged at each flue opening so that any kiln or boiler may be separated from the main flue and horizontal dampers are located



Belt conveyor to raw storage. Note spout from grizzly for fines. This Goodrich Blue Streak has been used for eight years



Pan conveyor delivering to Williams mill



at the base of each kiln stack. The horizontal dampers are closed when the waste heat gases from the kilns are turned into the main flue.

The flue and all connections are built of reinforced concrete, the walls being 9 in. thick and lined with  $4\frac{1}{2}$  in. of "Sil-O-Cel" and 9 in. of fire-brick. The bottoms of the economizers, waste heat boilers and the main flue are hopped and tunnels are provided under the boiler units and flue. The tunnels contain screw conveyors connecting to the hoppers by cast-iron spouts. Thus, the dust is drawn off into the screw conveyors and returned to the kiln feed tanks. Steam lances are used for blowing the dust from the boiler flues, this operation being performed once every 24 hours. The dust is also drawn out of the hoppers once every 24 hours. Each kiln is equipped with an inner air seal which prevents the cold air from entering the waste heat system.

#### Water Supply

The fresh water supply is obtained from two artesian wells, 1400 ft. deep. The water is pumped from the wells by means of an air-lift system and flows from the wells into a large concrete box which serves as a reservoir for the fresh water supply. This water is used for boiler make up and for drinking purposes and the overflow from the reservoir flows into the cooling pond which is located 30 ft. north of the power house.

The cooling or spray pond is 120 ft. wide, 202 ft. long and will hold  $6\frac{1}{2}$  ft. of water when full. The walls and floor of the pond are of reinforced concrete. A concrete wall runs through the center of the pond, thus dividing it in two parts. Either part may be emptied and cleaned without interfering with the operation of the other.

A 20 in. cast iron header goes through the center of the pond and contains 38 3 in. "Koerting" spray nozzles. Each spray nozzle has a capacity of 150 gal. water per minute at a pressure of  $7\frac{1}{2}$  lb. The spray pond serves two purposes; it acts as a reservoir for a large volume of water and acts as a catch basin for the spray. A 20 in. circulating pump takes the water out of the spray pond, forces it through the surface condensers and out through the spray nozzles into the pond again.

#### Load Carried

As mentioned previously, only three kilns were in operation at the time of the writer's visit and not all proper adjustments had been made. Waste heat was being supplied to the waste heat boilers which were generating enough steam to carry the load and also pull all auxiliary equipment. The switchboard at that time was only fitted for 2000 k.w. It is logical, therefore, to assume that with five kilns in operation and utilizing the entire waste

heat, the company will have sufficient steam to carry any load imposed upon the power house, without drawing on the auxiliary boiler.

The power house is of steel construction with corrugated iron covering. It is equipped with an overhead electric traveling crane of 25 tons' capacity. Two two-



A. F. Miller, consulting engineer, and O. V. Bartholomew, superintendent.

stage Sullivan air compressors furnish the air for pumping the water wells and also for general mill purposes.

#### Crushing Plant

The materials entering into the manufacture of cement (limestone and shale) are brought from the quarry to the crushing plant in 6 cu. yd. side-dump cars, hauled by a dinky. An approximate mix is obtained in the quarry.

Arriving at the crushing plant on a trestle 20 ft. above ground level, the cars are side-dumped into a hopper feeding a 36x60 in. Fairmount roll crusher. The crusher hopper is made of  $\frac{3}{4}$  in. iron plate reinforced by "I" beams. The hopper is held up by 8 and 10 in. "H" columns and thus is practically independent of the crusher and crusher building. The hopper, on account of its peculiar construction, takes up the impact caused by the force of the falling stone. The crusher is run by a 110 h.p., 550 v., 25 cycle, A.C. motor.

Before the installation of the roll crusher, a No. 9 gyratory did the initial crushing. Considerable fine material was obtained in the quarry and this went through the gyratory, flooding the conveyor underneath. With this in view, the company provided a large concrete pocket under the roll crusher capable of holding 12 cu. yds. The hopper is built integral with the foundation of the crusher.

A cast iron spout leads from the hopper to a 36 in. Link-Belt "Pacific" type pan conveyor operating at 60 ft. per min. on a 23 deg. inclination, and run by a 10 h.p. motor. The pan conveyor deposits the material into a cast iron spout fitted with a grizzly, the grate bars being 2 in. apart. This removes all the material 2 in. and under, which is by-passed to a belt conveyor delivering to raw storage. The material over 2 in. goes to a No. 7 Williams mill, which reduces the material to  $1\frac{1}{2}$  in. and smaller and deposits it on the same belt conveyor receiving fines from the grizzly. This belt conveyor is 30 in. in width, 95 ft. centers and on a 23 deg. inclination. The pulley for driving this conveyor is midway between head and tail pulley as the conveyor is slung from the roof trusses and no extra load could be put on the trusses. From the storage the material goes through the ordinary process of ball and tube mills until it reaches the kilns.

#### Organization

The president of the company is W. H. L. McCourtie; vice-president and general manager, C. E. Ulrichson; sales manager, A. S. Parsons; superintendent, O.V. Bartholomew, and assistant superintendent and chemist, J. William Ganser. A. F. Miller of Jackson, Mich., is consulting engineer for the company and is responsible for the design of the rock crushing and waste heat systems.

#### Heavy September Cement Production and Shipment

MORE THAN 11,300,000 barrels of portland cement were shipped from the mills during September, according to the figures of the U. S. Geological Survey. During the third quarter of the year a shipping record was established—33,970,000 barrels. For the nine months ending September 30, the shipments were 74,045,000 barrels, exceeding the former record volume in the corresponding period of 1920.

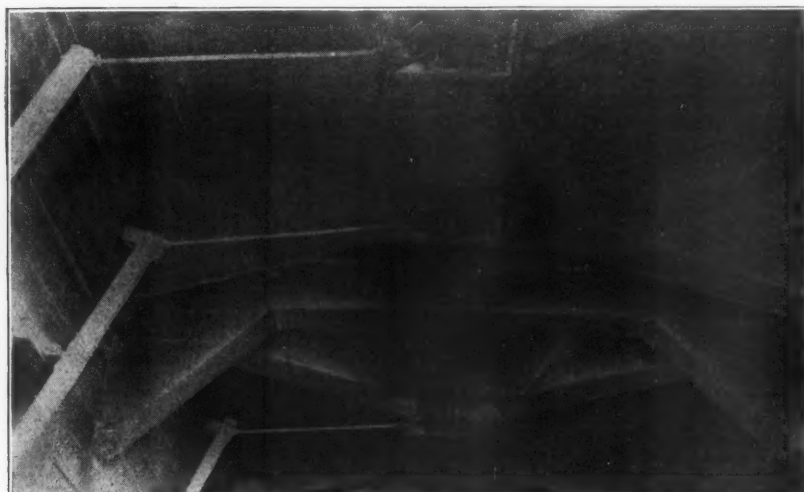
The large September production of 10,027,000 barrels of finished cement shows that operating conditions are favorable. Then, too, the average daily production exceeded that of August. If there had been as many days in September as in August, the September production would have shown the larger total.

As is customary in the season of active demand, cement stocks at the mills were drawn upon to supply the September demand. Stocks of finished cement at the mills at the end of September were approximately 6,953,000 barrels, as against 8,280,000 barrels at the beginning of the month—about 135,000 barrels below the September 1917-21 average.

# Hints and Helps for Superintendents

## Concrete Bin Detail

**D**ETAILS of reinforced-concrete bins for sand, gravel and crushed stone are always interesting. Herewith is a view of the bottom of the concrete bins



Concrete bin detail

for crushed limestone at the plant of the Norton Stone and Lime Co., Cobleskill, N. Y.

The bin bottoms of V-shaped, with sliding-valve gates, at the bottom of the flat V's. Each bin has two gates, operated by rods attached to wooden levers, which are moved from the ground level. The accompanying view is rather deceptive. The main load of the bins is carried on deep reinforced-concrete girders, with triangular braced ends. These girders also carry the reinforced-concrete partition walls of the bins.

The V-shaped reinforced-concrete bin bottoms are further supported by two reinforced-concrete ribs at each gate opening. These ribs are nearly level across the bottom, although the view looking upward makes them appear otherwise.

F. P. Norton is superintendent.

## Power Transmitted by Belting

**T**HE AMOUNT of power which a rubber belt is capable of transmitting depends entirely upon the quality and the weight of the duck, according to A. M. Oliver in the Engineering and Mining Journal. It is safe to say, however, and it will serve as a good guide, that a belt made of a good grade of duck will transmit the following horsepower per inch of width, per ply when traveling at a speed

of 1000 ft. per min., with an arc of contact of 180 deg.

Weight of Duck in ounces	Horsepower
36 .....	0.45
32 .....	0.4
30 .....	0.375
28 .....	0.35

be borne in mind that the tension thus obtained constantly decreases in service and in time will fall below the point at which it will transmit the desired power. It must therefore be retightened at intervals to restore its original tension. The stretch to which a rubber belt is subject varies, and it is not possible to name an average, but it will be found that rubber belting does not stretch nearly as much as leather belting.

The belt surface in contact with the pulleys is of no less importance. The foregoing table giving the horsepower for the various ducks is based on a pulley contact of 180 deg.; that is, exactly one-half of the smallest pulley over which the belt travels is in contact with the belt. The power transmitted will decrease in proportion to the arc of contact. The loss of power due to a decreased arc of contact is not, however, in exact proportion. Where the angle of the arc of contact is 90 deg., the power transmitted will be 65 per cent of the total 180 deg. The following table indicates the relation for arcs of contact less than 180 deg.

Arc of Contact in Degrees	Per Cent
100 .....	70
110 .....	75
120 .....	79
130 .....	83
140 .....	87
150 .....	91
160 .....	94
170 .....	97
180 .....	100

The arc of contact may be ascertained by multiplying the difference between the diameter of the two pulleys by 4.775, dividing the result by the distance between the pulley centers in feet, and subtracting the whole from 180 deg. Expressed in equational form:

$$\text{Arc of Contact} = 180 \text{ Deg.} - \frac{4.775(D-d)}{X}$$

D = diameter of large pulley in inches.

d = diameter of small pulley in inches.

X = distance between pulley centers in feet.

## Spacing of Drill Holes

**B**Y SPACING of drill holes is meant the distance they are placed back from the working face, and apart from one another. The term "burden" is commonly used to designate the distance from the working face to the row of blast holes, while the term "spacing" is applied to distance between the holes. However, except as otherwise specified and to avoid confusion, the term "spacing" as used in this article will apply to both dimensions; that is, the distance back and the distance apart.

The spacing of holes depends on the character and structure of material and height of working face. There are also other considerations: Namely, the purpose for which the blasted material is to be

To find the number of horsepower that a 12-in., 5-ply belt made of 32-oz. duck will transmit at 2000 ft. per min., the arc of contact being 180 deg., it is necessary to multiply 0.4 by the number 12 (the width of the belt), the result by 5 (the number of plies), and the product by 2 (double the power transmitted by 1000 ft. per min.). The answer is 48 h.p. Speaking approximately, in 99 per cent of all cases the power a belt will transmit depends on: The speed at which it travels; the tension under which it is placed on the pulleys; and the belt surface in contact with the pulleys.

The speed at which a belt travels governs the horsepower transmitted. If a belt traveling at 500 ft. per min., transmits one horsepower, at 1000 ft. per min. it will transmit two horsepower; at 1500 ft. per min. three horsepower, at 2000, four, and so on. Where the belt reaches a high velocity, centrifugal force causes a loss of power, but ordinarily this factor may be left out of the calculation. The belt speed may be found by multiplying the diameter of one of the pulleys by its speed and dividing the result by the constant 3.82.

The tension under which a belt is placed on the pulleys, called the initial tension, is the second important factor. It is common practice to cut the belt  $\frac{1}{8}$  in. shorter for every foot of its length when applying it. In other words, a belt 30 ft. long would be shortened by  $3\frac{3}{4}$  in. ( $30 \times \frac{1}{8}$ ). It must

used, the condition in which the broken material is desired and the kind of explosive to be used.

No hard and fast rules can be made with regard to spacing because the local conditions on two different jobs are never precisely the same, although their general characteristics may bear a similarity. At the beginning it is always advisable to use a spacing that will allow a factor of safety with regard to obtaining the desired fragmentation of the stone. If the stone is to

be broken small for crushing, a close spacing should be tried at first and later increased until a spacing is found that will give the proper shattering effect with the most economical explosive outlay. If the stone is being produced for rip rap, lime burning or other purposes where blocks of certain dimensions are desired and smaller sizes and spalls represent waste, it is better to use a wider spacing than might seem necessary and later reduce the spacing in case the stone is brought down in

blocks too large for economical handling.

The tables presented herewith suggest a method of spacing drill holes on faces of different heights in various kinds of material and the number of cubic yards of material in the solid displaced per foot of hole at different spacings. This table is only for the purpose of giving a general idea of the procedure followed in spacing of drill holes and should not be followed arbitrarily.—*Big Blast Hole Drills*, published by the Sanderson Cyclone Drill Co., Orrville, O.

KIND OF MATERIAL		Trap Granite Gneiss Quartzite	Hard, Solid and Thickly Bedded Limestone and Dolomite	Medium Thickly Stratified Limestone	Thinly Laminated Limestone	Sandstone	Shale Medium Hard to Soft
Recommended Diameter of Hole, Inches		6½ to 5½	6-5½	5½	5½-5	5	4½-4
Kind of Explosive—Average Conditions		60% Dyn.	40% and 60% Dyn.	40% Dyn.	30%-40% Dyn.	30%-40% Dyn.	30% Dyn. or Powder
Spacing in Feet for Given Depth of Cut, Feet	15	7 x 8	8 x 9	9 x 10	10 x 11	9 x 10	10 x 11
	20	9 x 11	10 x 11	10 x 12	12 x 12	10 x 12	12 x 12
	25	10 x 12	11 x 12	12 x 14	13 x 15	12 x 14	13 x 15
	30	11 x 13	12 x 14	13 x 15	14 x 16	13 x 15	15 x 17
	35	12 x 13	13 x 15	14 x 16	15 x 17	15 x 17	16 x 18
	40	12 x 14	13 x 16	15 x 18	17 x 20	16 x 19	17 x 21
	45	13 x 15	14 x 16	16 x 19	18 x 21	17 x 20	18 x 22
	50	14 x 15	15 x 17	16 x 20	18 x 23	18 x 21	19 x 23
	55	14 x 16	16 x 18	17 x 21	19 x 24	18 x 23	19 x 24
	60	15 x 17	16 x 20	18 x 22	20 x 25	19 x 24	20 x 26
Cut, Feet	70	16 x 18	18 x 22	19 x 23	22 x 26	20 x 25	22 x 27
	80	17 x 20	19 x 24	20 x 25	23 x 28	21 x 26	23 x 28
	90	18 x 21	20 x 25	22 x 26	24 x 29	22 x 27	24 x 29
	100	19 x 22	22 x 26	24 x 28	25 x 30	23 x 28	25 x 30
	120	20 x 25	23 x 27	25 x 29	26 x 31	24 x 29	26 x 31

Suggested spacing of drill holes on faces of different heights in various kinds of material

DISTANCE HOLES ARE SPACED APART IN FEET

		7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
7	1.81	2.0	2.33	2.7	2.85	3.11																			
8	2.0	2.37	2.65	2.96	3.26	3.55																			
9	2.33	2.65	3.0	3.33	3.66	4.0																			
10	2.7	2.96	3.33	3.7	4.1	4.44	4.81	5.18		5.55	5.92														
11		3.26	3.66	4.1	4.48	4.88	5.3	5.7	6.11	6.52															
12			4.0	4.44	4.88	5.33	5.77	6.22	6.66	7.11	7.55														
13				4.81	5.3	5.77	6.26	6.74	7.22	7.70	8.18														
14				5.18	5.7	6.22	6.74	7.26	7.77	8.30	8.81	9.33	9.85	10.37											
15				5.58	6.11	6.66	7.22	7.77	8.33	8.88	9.44	10.0	10.55	11.11	11.66	12.22	12.78	13.33	13.88	14.44	15.0	15.55	16.1	16.66	
16							7.11	7.70	8.30	8.88	9.48	10.07	10.66	11.3	11.85	12.44	13.03	13.63	14.22	14.81	15.41	16.0	16.60	17.18	17.77
17								7.55	8.18	8.81	9.44	10.07	10.70	11.33	11.96	12.59	13.22	13.85	14.48	15.11	15.74	16.37	17.0	17.63	18.26
18									8.0	8.66	9.33	10.0	10.66	11.33	12.0	12.66	13.33	14.0	14.66	15.33	16.0	16.66	17.33	18.0	18.62
19									9.15	9.85	10.55	11.3	11.96	12.66	13.37	14.07	14.77	15.43	16.18	16.88	17.60	18.30	19.0	19.70	20.40
20										9.63	10.37	11.11	11.85	12.59	13.33	14.07	14.81	15.55	16.30	17.03	17.77	18.51	19.26	20.0	20.74
21											11.11	11.85	12.59	13.33	14.07	14.81	15.55	16.33	17.11	17.88	18.66	19.44	20.22	21.0	21.77
22												12.22	13.03	13.85	14.66	15.48	16.30	17.11	17.92	18.74	19.55	20.4	21.18	22.0	22.83
23													12.78	13.63	14.48	15.33	16.18	17.03	17.88	18.74	19.59	20.44	21.39	22.22	23.11
24														13.33	14.22	15.11	16.0	16.88	17.77	18.66	19.55	20.44	21.33	22.22	23.11
25															13.88	14.81	15.74	16.66	17.60	18.51	19.44	20.4	21.39	22.22	23.14
26																14.44	15.44	16.37	17.33	18.30	19.26	20.22	21.18	22.14	23.11
27																	15.0	16.00	17.0	18.0	19.0	20.0	21.0	22.0	23.0
28																		15.55	16.60	17.63	18.52	19.70	20.74	21.77	22.83
29																			16.1	17.18	18.26	19.33	20.40	21.48	22.55
30																				16.66	17.77	18.88	20.0	21.11	22.22
31																									
32																									
33																									
34																									
35																									

TO CONVERT TO TONS

For Limestone, multiply by 2.27  
For Trap Rock, multiply by 2.52  
For Granite, multiply by 2.3  
For Shale, multiply by 2.18  
For Sandstone, multiply by 1.55

Number cubic yards of material in the solid displaced per foot of hole at different spacings



# Carbon Dioxide as a Fertilizer

## Gas Wasted in the Manufacture of Lime by Millions of Tons Is a Most Useful Plant Builder

THE POSSIBLE UTILIZATION of the two or three million tons of carbon dioxide—CO<sub>2</sub> gas—now wasted as "smoke" from lime kilns has been pointed out in three or four previous issues of *Rock Products* during the last three years. Recently the "Saturday Evening Post" carried a popular article on the subject, containing, however, much erroneous material and continuously referring to CO<sub>2</sub> as a "poison gas"—a war development.

### German Experiments

In all the published accounts of the German experiments, which are the source of nearly all the knowledge on the subject at present, great stress is laid on blast-furnace gases and no reference made to lime-kiln and cement-kiln gases. These latter are much more feasible sources of supply of CO<sub>2</sub> gas than blast furnaces, because lime plants are far more widely scattered and are generally in agricultural sections rather than in industrial districts.

Following is a summary of the present status of CO<sub>2</sub> as a fertilizer:

"Although up till 1860 it was believed that plants were able to feed themselves organically—that is to say, on carbon from the soil humus—since that date Liebig's theory of carbon dioxide assimilation from the atmosphere has been universally accepted. No importance has, however, until comparatively recent times been generally attributed to the fact that the air contains barely 0.3 per cent of carbon dioxide and that the marked development of vegetation in the carboniferous period, in which the coal measures were formed, might be attributed to the larger quantity of carbonic acid gas then present in the earth's atmosphere. Within the last four or five years, however, considerable attention has been given to the question of the possibility of increasing crop yields by adding to the amount of carbon dioxide normally present in the atmosphere surrounding the growing crops.

"This work has been done mainly by the German agricultural chemists, Gerlach and Riedel, but certain confirmatory experiments have also been carried out in the United States. Gerlach, for example, made experiments at the Agricultural Institute at Bromberg, in 1917, in which he compared crops grown in the open field with crops grown in glass cases in small greenhouses with or without the introduction of carbon dioxide.

The results obtained, although showing in every case a positive beneficial action, were not striking enough to justify any eulogies on the process. Riedel, however, worked out a method of applying carbon dioxide by utilizing the gases produced by combustion in the metallurgical industry, and erected an experimental station at Dortmund, where such gases were plentifully available.

### Hot-House Experiments

"The apparatus consisted simply of glasshouses into which burned and purified blast-furnace gas was introduced through a double set of perforated pipes running round the glasshouse. With tomatoes, a surplus yield equal to 2½ times the normal was obtained by the addition of carbon dioxide, and with cucumbers a surplus yield of 1.7 times the normal was obtained.

### Field Experiments

"Riedel also arranged a scheme for the treatment of plants in the open field with carbon dioxide, and for this purpose he set out square plots surrounded by perforated cement pipes, through which the residual blast-furnace gas was passed. Excellent results were obtained; in the case of potatoes the yield in the treated plot was 280 per cent of the normal, and in the case of barley 200 per cent. In 1918 the work was extended and even more interesting results were obtained, potatoes in the open field giving a yield four times as high as the normal.

"The question to be asked, however, is whether sufficient quantities of carbon dioxide at a reasonable price can be obtained for fertilizing purposes, for with the hope that this problem may be successfully solved the future of agriculture assumes a bright prospect. It is obvious that the use of compressed carbon dioxide must be at once dismissed as being without practical significance, and of the many combustion gases that may be used, blast-furnace gases seem to constitute the most convenient source of carbon dioxide.

These gases contain, it is true, carbon monoxide, but at normal concentration this is not injurious to plants, and it is in the interests of heating economy to reduce the content as much as possible.

"The exhaust gas from gas engines should also be especially useful, as it is under pressure and therefore does not require machinery to distribute it, particularly if it has to travel any distance. As regards the amount of blast-furnace

gas available, it must be remembered that a furnace charged with 100 tons of coke burns 85 tons of carbon, capable of producing 320 tons of vegetable matter, such as potatoes. In Germany alone, before the war over 4,000 tons of coke were used daily in the blast-furnaces of steel works. The time may possibly come, according to Riedel, when there will be special installations for supplying carbon dioxide for agricultural purposes, just as there are now special plants for the distribution of electrical power.

"The function of the carbon dioxide would not be in any way to supplant the usual nitrogenous, phosphatic and potash manures, but to act as an equally important factor in plant nourishment. Whether the application of this method of stimulating the productivity of the soil will ever assume large dimensions is extremely problematical. It would not appear feasible to transport the blast-furnace gases any great distance, as the cost of piping would probably prove prohibitive, even were the other adverse factors overcome.

### Lime Plants Fill the Bill

"In purely agricultural countries, where blast-furnace installations are few and far between, the project as a large-scale proposition may be at once dismissed, but in highly industrialized countries, where the necessary gases are plentiful and where the question of the most intensive cultivation of the limited areas of agricultural land is always pressing, adoption of the carbon dioxide system may prove highly advantageous. In a country like the United Kingdom, for example, any proposition which promises an increase in the amount of home-produced foodstuffs deserves earnest and serious consideration, and it is to be hoped that attention will be devoted to the subject by our English scientists, so that the surprising figures revealed by the preliminary experiments may be confirmed, or shown to be fallacious."—*Chemical Trade Journal, London.*

### Iowa Railroad Commission Hearing on Rates

THE announcement has been made that the Iowa Railroad Commission has fixed on Tuesday, December 5, as the date on which it will grant a hearing and investigation in the matter of carload rates and minimum weights on sand and gravel. This hearing will take place at the board's office in Des Moines.



# Lime in Cotton Bleaching

## Thorough Discussion of Both Advantages and Disadvantages of Lime as Compared with Caustic Soda

By Oscar R. Flynn

Chemist, Waldrich Bleachery,  
Delawanna, N. J.

### Necessity for Bleaching

THIS ARTICLE is a short discussion of the bleaching of cotton with especial reference to the relative merits of caustic lime and caustic soda as bleaching materials. The question is almost an international one, as in this country the use of lime has been practically abandoned, while in England, especially in the Lancashire district, its use is still quite general.

By caustic lime or more briefly lime, we are to understand *calcium hydroxide*, made by the combination of water with quick lime chemically known as calcium oxide. By caustic soda, we mean sodium hydroxide. Both of these substances are classed chemically as alkalis which may be defined as *soluble bases*.

To properly understand the use of caustic lime or caustic soda in bleaching, we must consider briefly the nature of cotton and the conditions of cotton fabrics as they come to the bleacher.

Cotton in whatever form it may be found when unmodified by chemical action, is a mass of fibres, each fibre being essentially a tube of cellulose which was originally attached to a cotton seed where it served as an organ of transportation for the seed, just as thistle-down serves for the transportation of the seed of the thistle.

Like all external plant organs such as leaves and the skins of fruits, the cotton fibre is coated with wax to protect it from moisture. Within the cellulose tube which constitutes the cotton fibre, we find a variety of non-cellulose substances, the remains of living protoplasm which once filled the tube. To these we may add fragments of the cotton seed and capsule, which contain much tannin. All of these non-cellulose substances may be described as the natural impurities of cotton. In addition to the natural impurities, we find in unbleached cotton cloth various adhering substances such as starch and grease used as dressing for the yarns in weaving, as well as dirt and mineral oil coming from contact with machinery, in handling and in transportation. These we may describe as artificial impurities.

The purpose of bleaching is the removal of the natural and artificial impurities of cotton so as to leave the cellulose in a pure and unmodified condition.

As cellulose itself is white, the word "bleaching" used in describing the whole process is sufficiently justified, although this condition of whiteness is far from being the only desirable result of bleaching.

If these various impurities were not removed, it would be impossible to properly dye a print-cotton fabric by many of the processes now in use, chiefly on account of the cotton wax which prevents the solution used in dyeing and printing from penetrating the fibre. It is possible by the use of chlorine preparations to whiten cotton without removing the various natural and artificial impurities, but cotton so prepared will not remain white but will change when subjected to high temperatures or in storing just as cheap paper changes and gets brown.

There is only one practicable method of purifying cotton cellulose; that is by treatment with alkalis. The underlying chemical principle involved in cotton bleaching may be enumerated as follows: Alkalies introduced into a mixture have a tendency to modify chemical action so that acid substances result with which they naturally combine to form salts. This action is especially apparent when solutions of strong alkalis act upon these compounds of carbon which are of animal and vegetable origin.

As oxygen is necessary for the formation of organic acids the free admission of air is favorable to this sort of action. Where air is not admitted the acid substances are formed by a rearrangement of the substances themselves in which rearrangement the water present usually takes part.

Cellulose, in the absence of air is not affected by dilute solutions of alkalis at temperatures which do not greatly exceed the boiling point of water. If the strength of the alkali and temperatures are sufficiently increased, either one or both, the cellulose is affected, giving rise to a modified cellulose with increased affinity for alkali, known as "cellulose hydrate." The change goes under the name of "mercerization," and is brought about intentionally by treating cotton with very concentrated alkalis at low temperatures. Cellulose hydrate, that is mercerized cotton, differs in its affinity for dyes from ordinary cellulose so that cotton which contains mercerized areas will not dye evenly.

In the presence of air a still more acid modification of cellulose is produced

known as "oxy-cellulose," which not only has different dyeing properties from ordinary cellulose but lacks its toughness and resistance to relatively high temperatures. The presence of areas of oxy-cellulose in cotton goods is manifested by darkening during steaming and drying and by unequal absorption of dyes. The change is not merely superficial rupture of the fabric but is also a consequence of the formation of oxy-cellulose.

The non-cellulose organic substances found in unbleached cotton fabrics are readily acted upon by solutions of alkalis at temperatures and concentrations which leave the cellulose unchanged.

The whole care of the bleacher is to so conduct the alkali treatment that the impurities will be completely acted upon, while the cellulose at the same time escapes modifying action. To this end, the unbleached cotton is packed in steel boilers known as "kiers," together with the requisite quantity of alkali and water.

After the air is displaced by steam, the kier is sealed by special valves and a tightly-fitting cover, from all external communication. The temperature is then raised by live steam or closed coils to the proper degree and there maintained. Meanwhile the alkaline solution is kept in circulation by means of pumps, injectors or by other devices.

While the hydroxides of any of the alkalis or alkaline earth metals might be used in the bleaching of cotton the matter of cost limits the bleacher to two, viz.: sodium hydroxide or calcium hydroxide, i. e., caustic soda and caustic lime.

### Sodium Hydroxide Vs. Calcium Hydroxide

The first point to be considered in a discussion of the relative merits of these two alkalis is that sodium hydroxide is a very soluble substance and forms very soluble salts with nearly all substances of an acid character and in particular with those acid substances which it generates in contact with the impurities of unbleached cotton.

Calcium hydroxide or caustic lime on the other hand is only slightly soluble and forms insoluble salts with many acids, especially with those which result from its modifying action on the cotton impurities. It is on this difference in solubility of the two alkalis and their resulting compounds that the arguments for and against their respective use must chiefly hinge.

In bleaching with caustic soda all of the alkali introduced into the kier will be

present in solution. At the beginning of the digestion it will be present in maximum concentration and there is danger of the formation of cellulose hydrate, especially where the cotton saturated with alkali lies in contact with a more highly heated surface. If in the effort to avoid mercerizing effects, the quantity of caustic soda is reduced, there may be insufficient present to react completely with the cotton impurities, with the result that the goods will not be properly absorbent and not able to withstand steaming and storing. In order to escape this dilemma many bleachers give the cotton two kier boils. Special devices are also used to prevent local overheating so as to avoid the production of these so-called mercerized stains.

In the lime bleach, the alkali is introduced into the kier in the form of milk of lime which is finely divided calcium hydroxide suspended in a saturated solution of calcium hydroxide. Such a mixture remains of uniform strength until the suspended lime is used up. The mechanism of its operation is as follows: The lime in solution acts on the cotton impurities and enters into combination with the resulting acids. This has a tendency to weaken the solution but this tendency is continually opposed by more of the suspended lime dissolving. The alkaline strength of a saturated solution of slaked lime under any circumstances is not nearly great enough to cause mercerizing effects and there need be no deficiency of alkali to complete the bleaching effect as an ample reserve is provided for by the undissolved lime in suspension. Hence by the use of lime the dilemma encountered with the use of caustic soda is avoided.

Owing to the solubility of organic sodium salts, the products of the bleaching action of caustic soda pass at once into solution. For their removal as well as the removal of any excess of alkali all that is required is a thorough rinsing in pure water.

On the other hand, the calcium salts formed during the lime bleach remain adhering to the cotton fibre and are not removed by subsequent washing. For their complete removal and the removal of the excess of caustic lime further treatment is needed.

A treatment with dilute hydrochloric acid, known as souring, transposes all the free and combined lime into soluble calcium chloride readily removed by rinsing but leaves much of the organic impurity adhering to the cotton as insoluble organic acids. To remove these together with dirt and mineral oil the cotton is returned to the kier where it is digested with rosin soap and then with a solution of soda ash. The latter converts organic acids into soluble sodium salts removable by washing with water. The former is an emulsifying and cleansing agent and acts on substances such as

mineral oil and dirt which do not go into solution as alkali salts.

In the caustic soda bleach it is possible to mix soaps and other emulsifying agents with the caustic soda so that this emulsifying and cleansing action may go on at the same time that the caustic soda is acting upon and solubilizing the other impurities. None of these agents may be added to the contents of the kier during the lime boil as the lime destroys them forming additional insoluble lime salts to be added to those which result from the action of the lime on the cotton impurities. Therefore no emulsifying and cleansing effect would take place.

Owing to the tendency of oxy-cellulose to form in the presence of air and alkali, the prompt removal of all surplus alkali is required as soon as the cotton is withdrawn from the kier. This as we have seen, presents no special difficulty in the case of caustic soda. Sometimes through the use of improperly slaked lime or lime which is incapable of proper slaking, particles of lime of sensible size remain entangled in the goods even after the hydrochloric acid treatment and rinsing. These particles in conjunction with the air cause the formation of oxy-cellulose and eventually of holes in the fabric.

The action of alkali in the absence of air with subsequent removal of the products of this action is the important part of cotton bleaching and when properly performed leaves practically pure unmodified cellulose which may be dyed and printed in a satisfactory manner and will not damage under steaming or storing. There nevertheless remain slight traces of some non-cellulose substances which prevent this product from being absolutely snow white. Where this absolute whitening is required a treatment with some oxidizing agent such as sodium or calcium hypochlorites is required followed by washing, souring and washing. This operation is independent of the kind of alkali treatment originally used and so does not enter into the question of the relative merit of lime and soda in cotton bleaching.

In conclusion it may be stated that fine lime owing to its low degree of solubility is well adapted to the bleaching of cotton without danger of mercerizing or incomplete action, but owing to the insolubility of the resulting calcium compounds, additional treatments are required for the final removal of the impurities. The effect of these additional treatments being to offset this advantage of the cheapness of lime over caustic soda.

Caustic soda is adapted to a simpler process of bleaching but owing to its solubility and the necessity of using it entirely in solution, the production of mercerized stains or the failure to completely remove impurities are complications liable to result from its use.

The general tendency of bleachers is

and has been to abandon the lime bleach for the caustic soda. It is quite possible however that the lime bleach might be improved by simplification, for example, by combining the soap and soda ash treatments using some free rinsing soap instead of the usual rosin soap.

### Solvay Process Co. Working Full Shift

PLANTS of the Solvay Process Co., Syracuse, N. Y., are now working on a 24-hour day basis. It is the first company in the section to start night shifts.

The Solvay and Semet-Solvay plants have gone through much reorganization since rapid deflation of prices forced industrial plants throughout the country to reduce high-priced inventories, readjust wartime wage scales and other abnormal costs in manufacture.

Recently the welfare department at the company plants was dropped entirely, not wholly because it was not needed, but because it represented a cost that could be eliminated. Many changes in the management have been made, and the readjustment to new peace time demands has been carried to every department.

Now on a new basis the companies have resumed the 24-hour day and contemplate increasing production gradually until the old maximum has been reached, with prices at a new low level.

### Longview Lime Works Installing a Rotary Kiln Plant

The Longview Lime Works, which together with the Saginaw Lime and Stone Co. operated by the Adams interests near Birmingham, Ala., are installing a rotary kiln plant which will have a capacity of 1,500 barrels of lime a day. This will bring the plant's total capacity up to approximately 2,500 barrels a day. The company is now shipping eight carloads of lime daily.

### Making Mortar by "Wet" Process

THE Lake Gravel Co., of Seattle, Wash., has extended its active operations by installing a modern mixing plant for the purpose of supplying ready-to-use mixed mortars and plasters. This plant consists of bunkers for the sand and lime, the latest type of Blystone mixer and an automatic dump car conveyor which carries the finished product into the receiving bunker, from which it is delivered direct to the consumer ready to use.

Hydrated lime is used, and the amount of lime, sand and water required for the mixture of each batch is exactly and accurately measured into the mixer and thoroughly mixed.

# Improved Conditions in the Crushed Stone Industry

## General Demand for Reduced Freight Rates—Bright Outlook for Highway Construction—Plenty of Labor at Reduced Rates

**AS EVIDENCE** of the improved outlook in the crushed stone industry, Secretary Sandles of the National Association, in the Bulletin for October 31, presents the following interviews from the field:

**H. B. Allen, Secretary, Eastern Stone Association:** Rates on crushed stone, slag, gravel and sand in the East reduced 18%. Rates since October 1 are as in August, 1920, with 15% added. Rates still high. Railroads should consider further reduction. Business spotty. Markets sluggish on small sizes, account of greater tendency to use larger stone for macadam and concrete roads as result of increased use of gravel and slag for general work. Ballast prospect latter part of season bright. Our railroad requirements between now and January 1 below normal. Plants will suspend operations earlier this year.

**N. L. Hely, Missouri:** No market for ballast or flux. We do not expect to sell ballast until cost of production gets cheaper than 90c per cu. yd. We are robbed by freight rates. We cannot ship stone less than 75c a cu. yd. A hundred-mile, one-line haul costs \$1.60 per yd. We have good agstone rate. Added pulverizing plant to our equipment. Missouri has a lot of money to spend on roads. We run about two-thirds' capacity.

**W. R. Sanborn, Illinois:** We have all cars we want. We never had flux business. Had usual amount of ballast. The 1922 highway program looks best ever. Common labor much cheaper and more efficient. Very little reduction in skilled labor, which is big part of pay roll. Coal, dynamite, repair parts, freight rates are less. Prices shot. All grades 65% of 1920 price, with prospect of lower. This, in face of biggest year of road building state ever saw and bigger one next year.

**Mr. Coykendall, Iowa State Highway Commission:** Freight rates too high. Present rates serious handicap in highway program. Road building not halted this season. We are completing largest program ever accomplished in a single year. Our 1922 program will be extensive. The 1922 work confined to grading, tile drainage, and gravel surfacing. This construction involves minimum amount of transportation of materials by rail.

**W. W. Boxley & Co., Virginia:** Stone industry dull. Railways taking 25% nor-

mal ballast. Unusual amount of highway work, but freight rates force contractors to put in crushing plants. Car service good. Little fluxing moved. Outlook for 1922 highway program only fair. Labor prices declined 25%, coal 25%, dynamite 10%, freight rates, none; ballast and commercial stone prices 20% lower. How can we start campaign to get freight rates lowered in Virginia? How did Ohio get its rates reduced?

**C. M. Doolittle, Canada:** Stone game here very good this summer. Road building booming. Very little stone used for flux. None for ballast. C. P. R. has put in a crusher plant for ballast business only. Crushed stone prices not changed since first of year. We are afraid they will take drop coming season. Labor and dynamite down.

**Charles A. Freiberg, Buffalo:** Conditions not very encouraging. We have had good year. Would like to ship until middle of November. Car service satisfactory. This will mean much to contractors and producers. No demand for flux. Some ballast to Erie Railroad. Big demand for concrete stone next season. Future highway program unsettled. Labor decrease 10%. Coal and dynamite higher. Steel, belting, quarry equipment, repairs on par 1919. Freight rate question remains unfinished business. New York producers and contractors discriminated against in shipments to other states; 40% increase recently granted by I. C. C. suspended by New York Commission. We ship at rates in effect August, 1920. Crushed stone, ballast and commercial stone 10 to 15% lower. More miles of road built in New York and Pennsylvania than any previous year. Plenty cars. Labor cheaper. Material moving with regularity. Contractors do work at a real profit. Great year for road contractors. When looking over bids for new highways big cuts are being made. Estimates by highway department liberal. Contractors underbid estimates from \$10,000 to \$15,000 per mile.

**W. S. Charles, Illinois:** General conditions not flattering. Trouble last two weeks securing cars. Railroads ordered empties to coal mines. No flux business. Railroads have no money for ballast. Labor prices 8% lower. Coal same as last year, which represents an increase of \$1.10 to \$3.40 per ton at mine and from

50c to \$1.22 freight over 1917-1918. Dynamite 25c per hundred pounds less. Labor, coal and dynamite are, so far as cost records are concerned, same as war period. We have been forced to reduce prices 28 to 30%. Railroads must reduce rates.

**J. F. Schroeder, Iowa:** Conditions improving. Car service good. Railroads should get wage situation in shape and repair motive power and rolling stock. Labor decreased 17½%. Coal down. Dynamite not lower. Our prices lower. No flux or ballast. Few shipments in agstone. Freight rates to be decreased with wages.

**A. B. Meyer, Indianapolis:** We have been busy. Will wind up season in fair shape. Car service satisfactory. Very little flux or ballast. Expect better demand from 1922 highway commission on basis of fair reduction on freight rates. Labor decreased 5 to 10%; coal and dynamite 10%. Freight rates in localities 10%. General material 10 to 15%. Reduction in road stone, flux, ballast and commercial stone 10 to 20%. Agstone sold 25c to 50c per ton less. Road building fairly well finished.

**Thomas McCroskey, Tennessee:** Conditions not satisfactory. High freight rates caused roadside quarries, sand and gravel pits to open. Car service satisfactory. Last year we had business and no cars. This season plenty of cars and not much business. No flux stone. Southern Railway taking ballast. Road building next year good. Labor reduced 20-25%; coal reduced even more. Dynamite double pre-war prices. No reduction in freight. Slight reduction in materials. Road and commercial stone 25 to 50% lower. Ballast reduced 25%. Road building slowed up account of uncertain government appropriations.

**W. M. Spencer, Missouri:** We have run one-half capacity. Plenty cars. No flux or ballast. Labor 10% less; mechanics same. Increase in coal and freight; 10% reduction on road stone, flux and ballast. Chairman of Missouri State Highway Commission, against the judgment of contractors, engineers and inspectors, forcing use of "Joplin chatts" (flint tailings) from the lead and zinc mines instead of limestone.

**M. W. Pugh, Minnesota Pipe & Tile Co., Mankato, Minn.:** Car situation sat-



isfactory. No flux or ballast. Small amount of rip rap. Highway program for 1922 not good. Decrease in labor 15c per hour. No decrease in coal, dynamite or freight.

**F. W. Schmidt, New Jersey:** Stone industry spotty. Some plants busy. Others doing nothing. Car service satisfactory. Very little flux. Quite a little ballast. Vigorous 1922 highway program if we raise the money this winter. Labor decreased; supply plenty. Coal cheaper. Freight rate higher.

**J. J. Sloan, Chicago:** Half of the Chicago district quarries closed. Values down to almost cost. Car service good. Flux 30%. Very little ballast. Labor down 15%, coal 50%, dynamite 10%.

Freight rates should cut; average advance of 80%. Last week Illinois let 105 miles of concrete road; 500 miles more to be let before January.

**President Krause:** Car service good. Outlook for 1922 road program good. Labor down 15%. Coal on contract, no reduction. Open market coal low at this time. Bids fair to advance sharply as we approach end of miners' labor contract March 31, 1922. Dynamite, supplies and machinery very little reduction. Stone prices 40% lower. Nation-wide demand for freight rate reduction. We understand Central Freight Association territory has ordered 15% increase over rates of August 25, 1920; this will not apply on Illinois intra-state traffic.

**R. W. Scherer, Milwaukee:** In Wisconsin engineers and inspectors have compelled gravel people to remove an excess of fines to bring up the proportion of coarse stone, adding to cost of production of gravel, but improving the resulting concrete. In Iowa poorly graded coarse aggregates are permissible, but only when cement content is adequately increased. If the cement content is increased, it means that an aggregate which does not require extra cement is worth 30c per yard more. This is when the cement content is increased only 10%. Larger variations from typical crushed stone grading requires 20 to 50% more cement to attain the strength of concrete.

# Temperature Measurements

## No. 2—How Measurements Are Taken—Classes of Instruments Used

WHEN WE SPEAK of temperature measurements in lime kilns, it becomes necessary to study the results critically. It becomes apparent at once that watching the temperatures alone will not bring results no more than would a draft-meter alone. Nor would the employment of a stack gas apparatus alone be conclusive (an instrument known as the Orsat stack gas apparatus (CO<sub>2</sub> recorder) is used for determining the composition of the escaping gases). While each of the three measuring instruments furnishes valuable indications, only a careful interpretation of the readings of all three together can furnish a true picture of what is taking place in the kiln. This is especially important when the lime is to be used for special purposes, or the stack gases are to be utilized as in the manufacture of sugar, when the carbonic acid content must be kept at a maximum.

In any case maximum efficiency can be attained when it has been determined at what temperatures, what rate of firing, what draft, etc., the fuel is best utilized and the best lime is obtained for the purpose in hand, whether it be for quick lime, hydrate, agricultural or for chemical purposes. The degree of efficiency attainable of course depends on the character of the limestone, the kilns, the fuel used and primarily on the manner of serving the kilns.

The foregoing will explain why measurements are taken; how to proceed with the measurements is the next question. Three classes of instruments are at our disposal and three places need to be observed. They are:

1. Pre-heating zone.
2. Firing-zone.
3. The stack.

In actual operation pyrometer readings

alone at 1 and 2 will suffice. In some cases, as when forced draft is used, regulation of this draft is essential but chemical analysis of the air is, of course, not necessary.

In the firing zone the strictest attention must be paid to the uniform increase in temperature and it is for this reason that it is measured.

In the stack, exhaustive measurements are imperative. It is here that the currents must be computed from the known amount of draft and known temperatures to enable us to properly regulate the draft and the progress of the firing. Determining the current in the stack by means of stack temperatures is the more important because in the decomposition of the limestone a part of the product, carbon dioxide, is in gaseous form and is added to the gaseous products of the burning fuel.

It has been computed that under ideal condition, 7.8 kilograms of coal are required to burn 100 k.g. of pure calcium carbonate. For burning this amount of coal 74 cubic meters of air are required; the 100 kilograms of limestone will lose about 26 cubic meters of CO<sub>2</sub> all at ordinary temperatures and pressures, so that the 74 cubic meters of draft air are increased by the 26 cubic meters of CO<sub>2</sub>. As compared with boiler firing, about 33½ per cent more gases leave the stack than enter the grates. The law of the expansion of gases when heated needs also to be considered and it is known that gas will double its volume when its temperature is raised 273 degrees C. Since the temperature of gases leaving the kilns is seldom less than 300 degrees C. allowance must be made for the fact that both the air of combustion and the CO<sub>2</sub> driven from the limestone have twice their volume at ordinary temperatures.

In actual operation these figures are materially changed from manifold causes—more than the equivalent of 7.8 kilograms of coal are actually consumed and much more than the estimated 74 cubic meters of air is admitted to the grates. Statistics of stack temperatures are futile without a knowledge of the volume of escaping gases, since this together with their composition reveals the progress of the lime burning—the driving off of CO<sub>2</sub> from the limestone.

(To be concluded)

## To Develop a \$10,000,000 Cement Plant in the Philippines

ACTIVE PREPARATIONS are being made for the development of a \$10,000,000 cement plant in the Philippines, according to the press reports. The plant, it is said, will be built by C. F. Massey, formerly active in the affairs of the Massey Concrete Products Corporation and now chairman of the board of directors. Mr. Massey sailed recently from Seattle, Wash., on the steamer Wenatchee. Later, sixteen of his business associates will join him in Manila, where the plant is to be established. When completed, the products will be distributed from Manila throughout the Orient.

A. Y. Gowen, vice-president of the Lehigh Portland Cement Co., who, as mentioned in ROCK PRODUCTS of July 2, is making a trip around the world in his yacht Speejacks, will later become associated with Mr. Massey in the cement business, it is said, joining him in Manila.



# Key to Unemployment Problem

A Statement by Employer Members of the Conference on Unemployment

WE APPEAL TO OUR fellow employers throughout the country to support the immediate program adopted by the Conference as a means of practically ameliorating the existing situation. We do not think our fellow citizens sufficiently appreciate the value of the insistence of the President and the Secretary of Commerce that neither Government relief nor public doles shall be considered as a means of meeting unemployment. This wise admonitory restraint aids us to avoid, on the threshold of our undertaking, the demoralizing experience of Europe with these prohibited methods.

The plans upon which the Conference has agreed are practical forward steps. But as employers, conscious of a high social responsibility, impelled alike by considerations of intelligent self-interest and public obligation to restore the employing power of productive enterprise, we do not believe our situation can be permanently improved until some of its chief causes are frankly recognized and squarely faced. Our prime difficulty is a high and unbalanced cost of production which is keeping goods and services beyond the buying power of consumers. That condition cannot be bettered until each of us recognizes it as a fact and does his part, individually and collectively, to restore a free exchange of commodities and services upon such terms that we may reciprocally absorb each other's products.

We believe we will gain nothing by quarreling over who is responsible for the condition, but, rather, must we investigate it intelligently and unselfishly to determine what the facts are and what are our respective obligations toward them.

Wages rose more slowly than prices during the war. Since then prices have naturally declined more rapidly than wages, and in the great field of foodstuff production farm products have declined more rapidly than the things for which they are exchanged, while fuel, transportation, and some construction costs are still predicated upon war-time costs. Costs in these fields of human activity are more greatly out of line than in any other and the effect is plainly felt in all our inter-dependent social transactions. The drastic economic adjustment through which we must pass in establishing new prices and values for goods and services know no favorites. Employers and employees, manufacturers, merchants, distributors, transporters, all must meet

them. For neither commodity prices nor wage rates can be maintained above the natural economic level.

That we must jointly find if we are to restore a self-supporting balanced industry which is the only doorway of prosperity for all of us. We must recognize these facts, for any blind refusal to see them or stubborn determination to oppose them merely delays practical readjustment and a business revival.

The present conditions help nobody.

## Helping the Situation Already

A REPORT made public November 3 by Secretary Hoover's permanent committee on unemployment states that within the last 30 days unemployment has been reduced by over 1,000,000. Manufacturers, producers and employers in all lines are making an earnest effort.

The part of rock product producers in a revival of industry is clearly shown in the same report which states that during the next few months the railways will spend \$500,000,000 on maintenance work (a part of this, of course, for maintenance of way), and that during the next 12 months highway construction to cost \$150,000,000 will employ 200,000 men.

To recognize and meet them is to help ourselves and the society of which we are a part. To selfishly and stubbornly resist them is to engage in a hopeless conflict with economic law.

Nobody can be made to work for less than he will. Neither can anyone afford to employ to produce what he cannot sell. Let us, therefore, reach a basis of mutually intelligent agreement between employer and employee in the interest of general society so that we may restore our general activities through intelligent recognition of common conditions.

Government can do its part by settling the costs of business operation represented in taxation, quickly, simply, and intelligently. If this vital economic problem is to become the football of partisan politics or given a merely political answer, the Congress will greatly delay if not prevent business recovery. Enterprise will not go forward nor individual

initiative be stimulated under any system which, penalizing active capital, drives wealth out of productive enterprise which multiplies jobs into the hiding places of tax-exempt securities where its utility is severely limited. Taxes are a cost of business operation, and if they are unduly burdensome, difficult of adjustment, and uncertain in their operation, they become of necessity a serious and injurious embarrassment to enterprise and in the present situation will hamper and obstruct necessary economic readjustment.

The present situation is indeed a test of our capacity as a people to work together and intelligently meet a situation in which every fundamental condition is favorable, and we alone can injure ourselves, either through our refusal to see the facts or our unwillingness in our private and public capacity to act upon them.

## Senate Passes \$75,000,000 Roads Bill

THE Senate on November 3 passed the \$75,000,000 bill for good roads.

Of this amount \$25,000,000 is made immediately available and \$50,000,000 will be available on January 1, 1922.

## Cement Specifications for Foreign Countries

THE specifications that the various countries of the world use in buying portland cement have been summarized in a chart that has just been issued by the Bureau of Standards of the Department of Commerce.

Cement is an international building material and thirty-two countries of the world have specifications for portland cement, twenty of which differ in important details from each other. Twenty-five others use the specifications of other countries in assuring the quality of the cement used in construction within the country, and many others accept the cement if it passes the tests of the country in which it is made.

Though the specifications differ in details and values, they include the same kind of tests in most cases. These are tests for chemical composition, specific gravity, fineness of grinding, setting time, soundness, and tensile and compressive strength.

In this country, there is one universal specification for portland cement, which has been adopted by the commercial interests, testing engineers as well as the Government.

# Defends Portland Cement Industry

President of the Portland Cement Association Defends Industry in the New York "Times"

THE PORTLAND CEMENT ASSOCIATION is circulating a reprint from the New York "Times," in the form of a signed article by Lester T. Sunderland, president of the association. It deserves to be read by every producer in the rock products industry. Here it is:

"Trade or industrial associations arise in response to definite needs; they are a product of the processes of economic evolution. Broadly speaking, they come under two classifications: (1) The modern 'Open Competition' associations, which have for their aim the more intelligent conduct of business in the commercial competitive field, based upon orderly and systematic ascertainment and dissemination of existing related facts, and (2) the 'Scientific-Educational-Promotional' associations, which have for their aim increased knowledge, usefulness and use of the products of the industry represented, without concern in the commercial competitive field.

"The Portland Cement Association, which originated in Philadelphia in 1902, comes under Classification 2. It is not commercialized in the usual sense of the word, and is neither concerned in the direct sale and distribution of cement, nor in the trading relationships between its membership and their patrons.

"Because of its simplicity of use, adaptability and enduring nature, probably no factory-made basic structural material occupies such a broad field of usefulness as does cement, or offers such promising opportunity for expansion of its uses. Recognition of these facts is primarily responsible for the existence of the Portland Cement Association, which is supported by manufacturers in the United States, Canada, Cuba, Mexico, Uruguay and Argentina.

"Many products and processes of great benefit to humanity have failed to achieve the full recognition and use to which their worth entitled them, because accurate knowledge of their value and utility was not intelligently sought and widely disseminated. It is only in recent years, since advertising under the pressure of competition developed into a true art, that producers have bought, by alliance of their forces, to effect a widespread knowledge of the utility of their products, and wherever the intrinsic value to mankind of the product has equaled the claims made for it markets have expanded, production has increased

and a great service has been rendered the public.

"The results already achieved by this association indicate clearly the great opportunity to secure that substantial trade expansion which lies in unified effort in the research-educational-promotional field, without in any degree sacrificing that element of wholesome trade rivalry so essential in the interest of public welfare. Were it not for the work this association has been doing for nearly twenty years, the public would still be largely without knowledge of the usefulness and adaptability of concrete, which is now a prime basic necessity in the forward march and progress of modern civilization.

"This association recognizes its responsibility to the public, as is evidenced by the constant effort it puts forth to prevent abuse or misuse of cement, correlated with its endeavors to advance its proper use. Through the research work of its structural materials research laboratory, which is maintained jointly and in co-operation with the Lewis Institute, Chicago, new knowledge is being attained as to how cement should not be used, as well as how it should be used. Our most capable and conscientious architects, engineers and contractors rely increasingly upon this association for 'concrete' facts; and through these professions the best interests of private owners, municipalities and taxpayers generally are served and protected.

"To know the possibilities of cement as disclosed by systematic and methodical research, to spread broadcast through association literature and advertising these findings for the benefit of mankind in order that concrete (in which cement is the basal ingredient) shall give the greatest service possible—in brief, to improve and extend the uses of concrete, are the objects and aims of the Portland Cement Association.

"In the association's scheme of organization and policies the ideal of democracy is its guiding principle; any cement manufacturer may belong to it, no cement manufacturer need belong to it. Each member, without reference to size, has but one vote in helping to establish and promote its policies.

"It is through the principles and practices adhered to in the conduct of this association's work that its members express: (1) Recognition of their respon-

sibility to the public; (2) faith in the utility of their product, and (3) belief in the value and necessity of research-educational-promotional work as a developer of their markets."

## Cement Manufacturers Petition for Lower Rates

APPLICATION for a reduction in railway rates for the transporting of cement in Kansas, Iowa and Oklahoma, made by the Iola Cement Traffic Association, with headquarters in Kansas City and mills in the grain belt, and the Dewey Cement Co. of Dewey, Okla., was put before the Interstate Commerce Commission recently. The Commission hearing was held in the United States district court room in the government building.

T. J. Money, Washington, conducted the examination of witnesses for the Commission. B. L. Glover, Kansas City, traffic manager of the Iola Cement Co., acted for the complainants. Attorneys for railroads interested were present.

Among those who attended the hearing are: H. S. Colvin, Sunderland Bros. Cement Co., Omaha; Henry McGrew, Bonner-Portland Cement Co.; Clyde M. Reed, Kansas public utilities commission; C. B. Bee, Missouri public utilities commission; F. C. Taylor, Missouri Portland Cement Co.; C. C. P. Rausch, Missouri Pacific Railway Co.; C. B. Condon, Hawkeye Portland Cement Co.; Frank Wilke, Continental Portland Cement Co.; Walter S. Whitten, Chamber of Commerce, Lincoln, Neb.; J. A. Little and Hugh LaMaster, Nebraska state railway commission; L. T. Sunderland and F. E. Tyler, Ash Grove Lime and Portland Cement Co.; Ray W. Moore, Dewey Portland Cement Co.; S. A. Smith, Western States Portland Cement Co.; J. C. LaCoste, Chicago, Rock Island & Pacific Railway Co.; B. L. Glover, Iola Portland Cement Co.; F. E. Anderson, Chicago; E. W. Martindell and James E. Benedict, Colorado Portland Cement Co.; Walter Young, Atlas Portland Cement Co., New York; Thomas L. Phillips, Portland Cement Co., St. Louis; F. E. Paulson and E. S. Gubernator, Lehigh Portland Cement Co., Allentown, Pa.; K. F. Burgess, F. J. Lawless and L. C. Mahoney, C., B. & Q. Ry. Co.

# New Ohio Hydraulic Sand-Gravel Plant

M. A. Callahan, "Sand Man" of Cleveland, Erects Modern Hydraulic Dredge and Gravity Screening Plant Near Kent

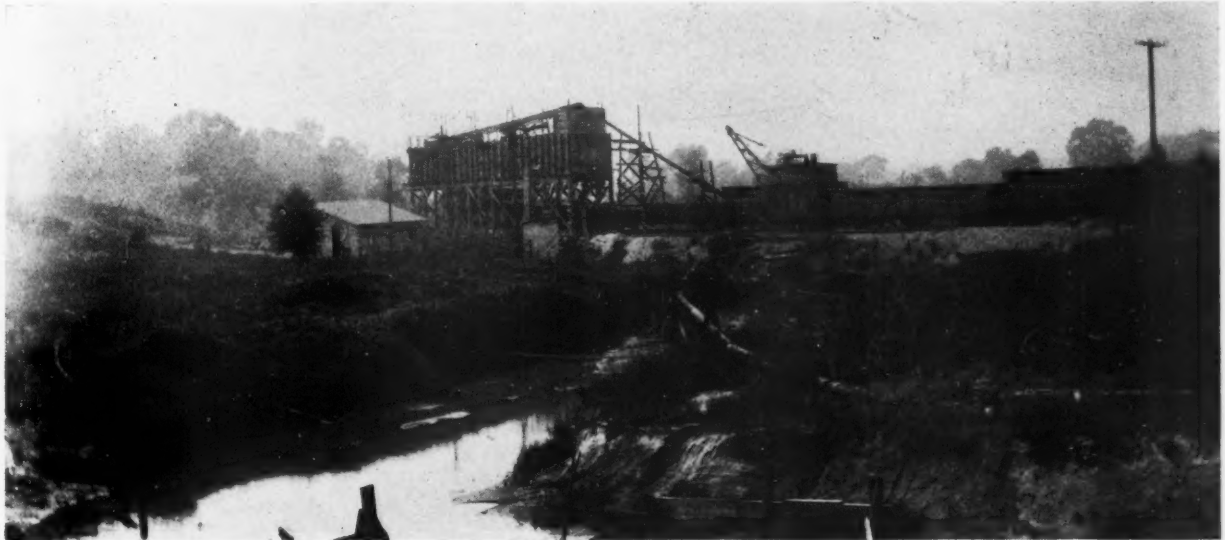
ONE OF THE most recent developments in the sand and gravel industry in Ohio was the completion and the operation of M. A. Callahan's new hydraulic dredge and gravity screening plant, near Kent,

one per cent silt in any case. About one-quarter of the deposit is gravel. The present dredging excavation is at a depth of about 60 ft. from the surface.

A hydraulic monitor is used to cut the

## The Dredge

A swinging boom at the front of the dredge supports the suction hood. The boom is raised and lowered by a double drum electric hoist. A three horsepower



Screens and bins seen from the dredge

Ohio. Incidentally this plant marks a growing tendency for hydraulic operations, wherever a supply of water can be had. Power is used at only one point at this plant and is confined to the dredge for raising and for pumping the mixture of water, sand and gravel to the screening and loading structure. The screens being neither revolving nor shaking, but stationary, require no power, as the grading is done by gravity and the hydraulic pressure that brings the mixture to the screens.

Operations on the plant were started early in 1920. The hydraulic dredge was built on dry land on a site about 1000 ft. from Lake Stewart, as the land intervening between the dredge site and the lake is of such a character that it was found most simple and convenient to excavate a small channel from the lake to the point of operation, which is in a slight depression between two hills. Dredging was started and the excavated area increased until the dredge itself was floated.

## Character of Deposit

The sand and gravel deposits in the locality are deep and of excellent quality. At no point in the present site of operations is any stripping necessary, and tests of sand delivered to the bins show not more than

bank down into the lake from which the large dredging pump delivers it to the screen on top of the bins. These bins are located on a loading spur of the Pennsylvania R. R. and are about 450 ft. distant from the present location of the dredge.

motor on a single drum hoist moves it from side to side. The dredging is done by a 12-in. Morris centrifugal pump. The shell has a diameter of 48 in. and it is of special design, and is of manganese steel, but of the same type as the regular cast iron shells.



M. A. Callahan, the Sand Man, and three of his four sons. Left to right: M. A. Callahan, Norman Callahan, Clifford Callahan, Dave Callahan





General view of sand deposit



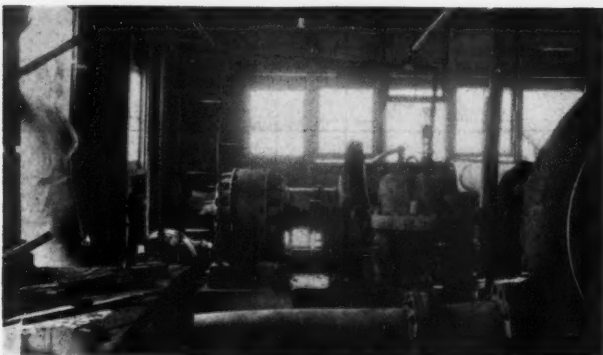
Callahan at the hydraulic monitor



Dredge and discharge line to screening plant



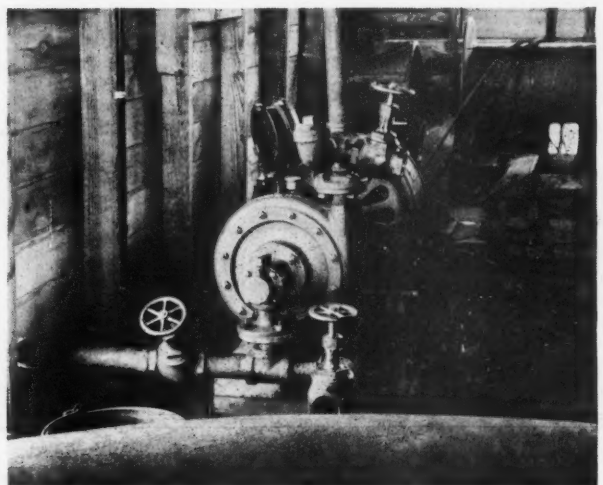
Hydraulic monitor cutting into bank



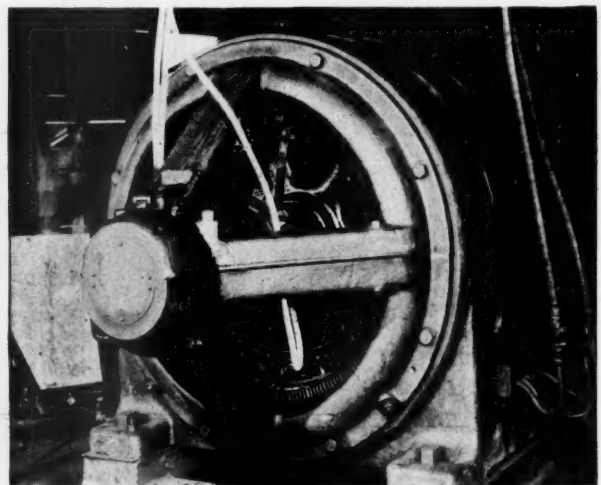
A two-stage centrifugal pump supplies the hydraulic monitor



This 12-inch pump has a specially designed manganese steel shell. De Laval pump in the background supplies the sluicing monitor



The priming pump

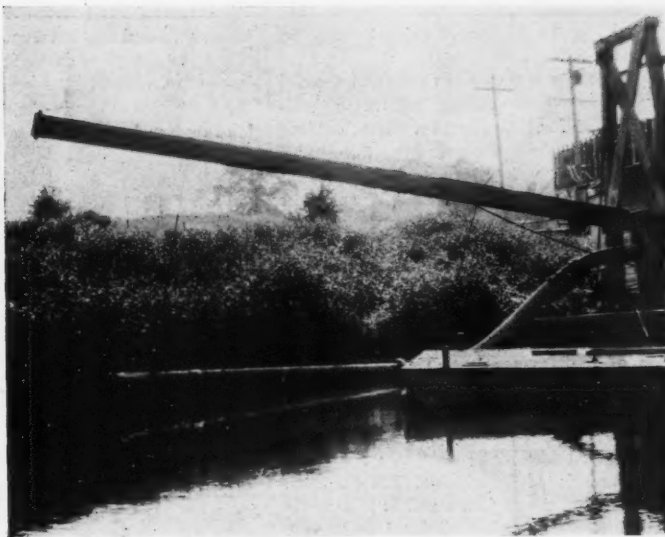


The pump





Sand from the grass roots down



Boom for handling the load



Flume with gravity screens. Bins below



Screening plant and loading station

There is, however, one notable difference in that the casting is made double thickness at the points of greatest wear, and has been in use since the dredge began its operation. It is still in good condition. A 250 h.p. three-phase induction motor furnishes power for the pump, which is turned at a speed of 500 r.p.m.

Sand and gravel in the bank above the water level is loosened by a powerful stream of water from a nozzle on the dredge, after the manner of hydraulic mining. This is perhaps the first use of a hydraulic monitor for this purpose.

The hydraulic monitor is supplied by a 6-in. two-stage De Laval centrifugal pump, operated by a 100 h.p. induction motor. The pressure obtained with this type of pump is 175 pounds per square inch, sufficient to drill into the banks very rapidly. A small motor driven pump supplies water for priming the larger pumps.

#### Electrical Operation

Electrical power is used throughout. It is purchased from the Northern Ohio Traction & Light Co. and is received at 28,000 volts. A set of three 75 K.w., 4-way, 3-wire



Gravity does the work in this screening plant

system transformers reduce the current to 440 v., which voltage is used on all power equipment. For illumination four lights are connected in series and 110 v. lamps are used. The entire plant and grounds are lighted electrically. The power is transmitted from a distance of three miles and represents an investment of \$22,500 on M. A. Callahan's part.

#### Screens and Bins

The bins are 80 ft. long and provide a storage capacity of 500 tons. Footings are of concrete, 12 ft. deep, with a width of 6 ft. at the base to give ample bearing. They are 18 in. wide at the top. All framework for bins, both studs and joists, is of channel steel. The bents supporting it are of 12x12-in. timber. Bin walls are of 2-in. planking.

Screening is accomplished entirely by gravity. The delivery line from the dredge discharges into the upper end of a sluiceway which has screen sections inserted in the bottom at intervals over the various bins. The flume is 80 ft. long, 14 in. wide and 18 in. high, with 12x24 in. provisions for screens. Division is now made into

brick, torpedo and concrete sand, pea gravel,  $\frac{3}{8}$  to  $\frac{5}{8}$  in. and  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. gravel. All gravel over  $1\frac{1}{2}$  in. is wasted down the spout, shown at the left of the end view of the bins. At present the waste is being used for filling and levelling, building drives, etc. As the coarse gravel is scarce in these deposits a very small portion reaches the waste spout, not in sufficient quantity to warrant the construction and operation of a crushing plant.

There is capacity on the company's tracks for 40 cars. They are spotted by gravity, four cars being loaded at one time and disposed of also by gravity. During operation of the dredge four cars an hour can be loaded.

In discharging to the top of the bins the dredging pump works against a static head of about 50 feet. The discharge line from the pump is of 12-in. pipe, 800 ft. long, with flexible sleeve joints and is laid fairly straight, reducing the frictional resistance.



Oversize gravel is discharged across the tracks by this spout

The labor required for full operation is one man at the dredge, one man on the bins and two men on the cars. The men on the cars spot them and trim the loads.

#### Plans for Future Development

The present development at the Kent plant has been under way but a short time. The immense deposits owned by the company make operation on a large scale possible. Among other plans for increasing the output is the provision of additional trackage and car storage space. On the main line of the Pennsylvania R. R., as it is, the shipping facilities are excellent. Car storage tracks are to be extended, passing tracks built, and much of the car handling is to be done eventually with the company's own locomotive.

#### "Callahan, the Sand Man"

The plant at Kent is owned and operated by M. A. Callahan, known throughout the entire territory as the "Sand Man," and his four sons. M. A. Callahan started in the sand and gravel business some 40 years ago

by dredging sand from Lake Erie near Cleveland and has the reputation of being the first to commercialize it. He is said to be the first man to get sand and gravel from the Cuyahoga River in the vicinity of Cleveland and so is really the pioneer of the in-

dustry in Northern Ohio. The plant at Kent was built and designed by Mr. Callahan and his four sons. It is one of those unusual families where everybody concerned has been brought up in the sand and gravel business.

## Advantages of Incorporating an Association

By Ralph H. Butz

A QUESTION that frequently presents itself to the members of trade and business associations is whether they had better conduct their affairs as an unincorporated body or as an incorporated association. To answer that question it is necessary that they know the advantages to be derived in either case.

As far as the officers of an association are concerned, they should certainly prefer to act as officials of an incorporated association rather than of one which is not so organized. An official of an unincorporated association, unless he specifically arranges otherwise, is usually liable personally for such debts of the association as he may contract. On the other hand, an official of an incorporated association, if he contracts in the name of the association, as he must to bind the association, would not be personally liable.

About the only important advantage in favor of the unincorporated association is that it is more difficult for outside persons to bring suit against the association. It is the law in most states that a suit against a voluntary unincorporated association must join all the members in the action by name. But even this is not such a great advantage as may at first appear, for if the claim is of any importance the party bringing the action can discover the names of the members and start proceedings.

An incorporated association may be sued like any other corporation, by simply serving upon the proper officers of the organization. While the liability of members of an unincorporated voluntary association has been brought before the courts for decision, it is nevertheless rather clear in the opinion of state officials and attorneys, that this liability would be construed to be that of a stockholder in a business corporation.

Assuming that an unincorporated association makes contracts for advertising, leases, etc., which it cannot carry through, each member might have to pay his share of the contracted indebtedness. An incorporated association could be forced to pay only to the extent of its assets, and without touching the pockets of its individual members.

Or the executive officers of the association might be out on business for the association, and while so employed may cause the injury of some person. If the asso-

ciation is not incorporated, each individual member would be liable for damages to the person so injured. If the organization is incorporated, it is probable that the injured party could get nothing more than the value of the property or other assets belonging to the corporation.

The member of an unincorporated association is liable for damages for conspiracy, if he actually takes part in it or if he impliedly ratifies it, or if it is an incident of the working out of the purposes of the association.

The members of an unincorporated association are responsible for tortious (wrongful) acts committed by the society, where it can fairly be said that they were within the scope of the purposes for which the organization was formed. This liability is not the liability of a partner. As has been said by one authority:

"The liability of a member for debts contracted in behalf of the association is governed, not by the principles of partnership, but by those of agency. Membership as such imposes no personal liability for the debts of the association, but to charge a member therewith it must be shown that he has actually or constructively assented to or ratified the contract upon which the liability is predicated. If, however, a member, as such, directly incurs a debt, or expressly or impliedly authorizes or ratifies the transaction in which it is incurred, he is liable as a principal. So a member is liable for a debt which is necessarily contracted to carry out the objects of the association."

It is usual for incorporated associations to enjoy the benefits of efficient by-laws, in contrast to the slipshod, poorly drawn constitution and by-laws of most unincorporated associations. An attorney usually supervises an incorporation and draws the by-laws, while the usual unincorporated association delegates this duty to a committee of members, whose intentions are of the best, but whose experience is decidedly limited in this field. The constitution and by-laws are usually something which a member knows exist, but which he knows and cares very little about until trouble starts.

If there is any advantage as between incorporated and an unincorporated association, it certainly lies with the body which has been incorporated.

# Sand Settling and Sand-Settling Devices

## Part II, No. 11. Classification—Baffles

IN ALMOST every form of sand settling device we find something placed to obstruct or direct the current of the feed stream, or to confine agitation. These obstructions are called baffles. Sometimes one sees them so badly placed

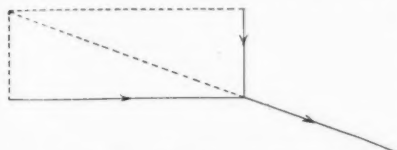


Fig. 41—Diagram showing how gravity and the force of the current make the path of a grain

that they defeat the purpose for which they were introduced; that is, the better settling of the sand, so it is worth while to study them and the principles by which they are designed. To do this, we must first consider the effect of the forces acting on a particle settling in a current.

Primarily, there are two forces acting at right angles, the flow of the current, which impels the particle horizontally, and gravity, which impels it vertically downward. The effect of these is to send the particle downward at an angle which varies with the relative strength of these two forces.

In the case of ordinary size grains of sand, acted upon by water flowing in a launder, the force of the current is much greater than the force of gravity. A 20-mesh grain of sand has a settling rate of nearly 4 in. a second, but the current in the launder may have a velocity of 12 or 15 ft. a second. Hence a grain starting at the top of the current would have a considerable distance to go before it reached the bottom of the launder.

And there are other things to be considered. The current flowing in a launder has not the same force at all parts of its section and it does not flow in the same direction in all places. The general direction is forward, following the slope of the launder, but there is an infinite number of cross currents and up and down currents created by the friction of the water against the bottom and sides of the launder. In a pipe, the effect of friction is often to give a spiral motion to the current.

Hence we see that a grain in a current may have a number of forces acting upon it from different directions, and it will

move in the direction which is the resultant of these forces. If we look at sand which is in clear, flowing water we will see that the grains are moving from side to side and dancing up and down, according to the strength of the currents by which they are caught. These local currents are called eddies, and they have a powerful effect upon the settling of sand.

### Baffles Which Produce Eddies

In rivers, we may note the effect of eddy currents on a large scale. The

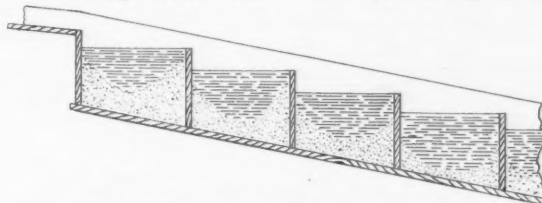


Fig. 42—Section through part of cascade

stream, in changing its direction, owing to a change in the shape of the bank, forms an eddy current, and any grains of sand which get into this eddy are sent around and around and into the bank until they finally lodge. In a short time a sand bar is formed. An astonishing amount of material is deposited by some rivers in this way. There are large sand

placed in the launder in the illustration of a launder classifier in the issue of September ..... Riffles of this type are placed in the sluices used in placer mining to induce the grains of fine gold to settle.

### The Cascade

An example of underwater baffles, which work like riffles, is to be found in the cascade, which was formerly used a great deal for catching sand, fine phosphate rock and the like. It is out of use now, not so much because it was so inefficient a settler as that it is very troublesome to discharge, and because the first boxes fill up at once, and then it is only running at part of its capacity.

As shown in Fig. ...., it is a sloping

box, with baffles so placed that the current flows down a series of stair steps. Eddies are formed as the current approaches the baffle, and also by the plunging effect of the current going over the baffle. Both aid in the settling of the sand.

### Side Wall Baffles

These project from the side walls of

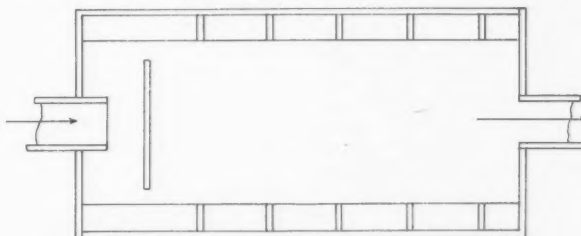


Fig. 43—Plan of settling tank with side wall baffles

producers who dredge the same bar of a river over and over again, always finding a new deposit to replace that which they have taken away.

Naturally, designers of settling devices have sought to secure this settling effect of eddies by using baffles to obstruct and change the direction of the current. As an example, not the "stop" or riffle,

the settler through which a current is passing, and change the direction of the current locally. Eddies are formed and the sand is deposited for the same reasons that it is deposited on river bars.

Side wall baffles are not often found in wet settling devices, but they are quite often found in the dust chambers which are used to settle the fine dust from



smelters and dryers. In this case, the particles are carried by a current of air instead of a current of water, but the effect is the same.

#### Grate and Bar Baffles

Baffles made of bars, set sometimes so as to form a grate, have been used to form a great number of eddies, by breaking up the main current in a number of places. Sometimes peculiar shapes are

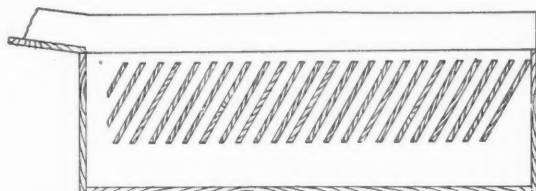


Fig. 44—Section through settling box with De Kalb's baffles

given to these bars, to aid in the production of eddies. Although they have a considerable effect in slowing down the current, the writer has not been able to see that the effect of these baffles is greater than would be produced if the current were to be slowed down to the same degree by other methods. The narrow passages between the bars cause a rapid current locally, and these rapid currents keep the sand suspended.

One form, in which the grate idea was carried to the limit, consists of a lot of wires suspended quite close together in the current. It was patented about twenty years ago, and came into some use in concentrating mills. The writer had three of them in use, but could not see that the settling was any better with them than it was without them.

#### Underwater Grate Baffle

There is, however, a form of grate baffle which has a very good effect on settling, especially on the settling of the fine grains. This is shown in Figure ..... The grate is placed just under the current, and it creates a lot of eddies that may be said to roll on a horizontal axis. These eddies catch and hold the grains, which finally drop into the still water below the baffles. The writer has seen this form of baffle introduced into a long sand flume, for catching fine sand, with very good effect. Mr. Courtney De Kalb, a well-known mining engineer, is the inventor of this form of baffle.

In an Australian plant, baffles of corrugated iron, of the type described, were placed in a flume that was used to settle fine material. The effect was so good that the water came away practically clear, whereas before the baffles were placed in it the water came away muddy.

Professor Richards, while experimenting with a surface current classifier, discovered that he could get a good effect from a board full of auger holes placed

below the surface current. The effect is evidently the same as with the baffle just described.

#### Baffles Wrongly Placed

A method of placing baffles which hinders rather than helps the settling of the grains is shown in Fig. .... It is true that eddies are created, but they are faster and have more carrying power than the current would have if it was

allowed to flow quietly through the settler.

It is curious to note that while baffles are often placed in this way with the idea of getting better settling, the same arrangement has been patented in connection with a screw classifier as a means of keeping the fine sand from settling around the screw and forming an arch.

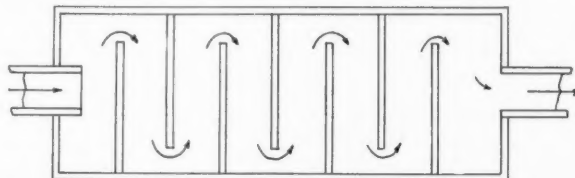


Fig. 45—Plan of settling box with baffles that hinder settling

#### Other Uses of Baffles

So far baffles have been spoken of only as a means of creating eddy currents, but they have another and more important use in confining agitation to a small area of the settler. For example, where the feed stream falls into a settler, bubbles of air are carried down, and these in rising cause considerable agitation in the settling area. If the stream falls into a circular baffle, the agitation from these rising bubbles of air will be confined to the area enclosed by the baffle, and the effective settling area will be increased.

A baffle placed in front of where the feed stream falls has also a good effect, as it spreads out the stream and keeps it from running in a direct line across the settler. Both of these uses of baffles are very commonly found in settling devices.

In conclusion, it must be said that the use of baffles as aids to settling is usually disappointing. The one sure way to secure good settling is to provide sufficient area so that the feed stream slows down sufficiently to permit the particles to fall.

## Tennessee Sand, Gravel and Stone Association Organized

REPRESENTATIVES of all the big sand, gravel and stone interests met at Knoxville, Tenn., on October 9 and organized the Tennessee Sand, Gravel and Stone Association.

The principal objects of the association will be to further the use of concrete materials and to make an effort to obtain lower freight rates on these materials.

In ten of the southern states, sand, gravel and stone men have already started a fight for lower freight rates, and the newly formed Tennessee association will get behind these men and work with them. Present freight rates, declare the materials men, are delaying building and highway construction and keeping a large number out of employment.

The officers of the association are as follows: President, T. L. Herbert, Nashville; secretary-treasurer, F. J. Fuller, Nashville; vice-president, H. B. Springer, Chattanooga.

Members of the executive committee, representative of the state districts, will be elected later.

Those present at the meeting included: C. S. Todd, Kinzel-Thompson Co., Knox-

ville; George W. Fooshe, Camden Road Material Co., Memphis; W. L. Smith, Memphis Stone & Gravel Co., Memphis; T. J. Fuller, Franklin Limestone Co., Nashville; H. B. Springer, Bible Sand Co., Chattanooga; T. L. Herbert, Jr., T. L. Herbert & Sons, Nashville; L. R. Peete, Allen Gravel Co., Memphis; A. D. Creighton, Foster & Creighton Co., Nashville; Ben Heikens, Estill Sand & Gravel Co., Estill Springs; H. E. Richardson, Nashville Builders' Supply Co., Nashville; Milton McDermott, Knoxville Sand & Transportation Co., Knoxville; A. Harris, Holston Quarry Co., Knoxville.

## American Road Builders' Association to Meet in Chicago

THE ANNUAL CONVENTION and good roads show of the American Road Builders' Association, with headquarters in New York City, will be held in Chicago on January 17 to 20.

This convention will undoubtedly attract a large attendance of highway engineers and the show will be of the same high character as in past years.



# Cement Industry in Mexico

General Conditions Show Signs of Improvement—Production Increasing

MEXICO HAS BEEN passing through a long period of revolutionary activities which has curtailed construction work considerably.

The high price of the silver about a year ago, stimulated mining interests to increase their mills and open up old and previously unprofitable mines, but the recent slump in the price of the metal has caused them to again curtail their expenditures. Also, the present low price of crude oil has put a stop to the lavish expenditure which was going on in the oil fields.

There is now some hope of the political situation becoming more stable, which will increase the amount of general construction outside of the two industries mentioned above.

Until recently cement was scarce and high priced in Mexico, there being but two cement mills operating, and these two running at under half capacity on account of lack of fuel. This scarcity of oil was entirely due to the very poor transportation facilities offered by the railways.

The two companies who were operating through all the revolutionary period were the "La Tolteca" Cia. de Cemento Portland, S. A., with a 1,700 barrel plant at Tolteca, in the State of Hidalgo, within 50 miles of Mexico City, and "La Cruz Azul," Cia. Manufacturera de Cemento Portland, S. A., with a plant capacity of 1,000 barrels a day.

The combined production of these mills, until a few months ago, was only about 4,000 metric tons a month, equivalent to 800 barrels a day, this low production being entirely due to lack of fuel oil. Both these companies have now railway equipment to handle all of the fuel required. The Tolteca Company has two locomotives and 70 tank cars in its service and the Cruz Azul has just purchased a locomotive and 20 tank cars are now in use.

The present production of these two plants combined is about 12,000 metric tons a month, equivalent to 2,400 barrels a day. This is an increase over their production up to June of this year of 8,000 tons a month, or 1,600 barrels a day. This amount is more than sufficient to take up the quantities of cement which were imported into Mexico in the last few years, which amounted to an average of 800 barrels a day.

Besides these two plants, the Cementos Hidalgo Co., whose mill of 1,800 barrels is situated near Monterey, has recently started up, and is now operating at 75 per cent capacity.

There is also under construction in

Monterey another 900-barrel mill, which will start operations in November next.

At Puebla, in the south of Mexico, a 300-barrel mill started manufacturing during the month of August.

These plants manufacture cement in strict accordance with the specifications of the American Society for Testing Materials. They have the most up to date American machinery and are all fortunate in having excellent raw materials. The quality of

**THIS ARTICLE** was obtained from one of the officials of a Mexican portland cement concern and corrects the statements made by the American Chamber of Commerce of Mexico City on the "Cement Industry in Mexico." These statements were erroneous and might lead manufacturers to an entirely wrong conclusion regarding the cement industry in Mexico. —The Editors.

their cement is in every way equal to the foreign cement and excels many brands. All these plants are now operating with the dry process, and using limestone and shale, with fuel oil for burning.

The only important piece of construction in view just now, is the new hydroelectric development being undertaken by the Mexican Light and Power Company, Ltd., for which a first order of 7,000 metric tons, equivalent to nearly 42,000 barrels, has been obtained by the Tolteca Co., which has sold 23,000 tons of cement to this company in previous years, without a single rejection.

The Mexican mills pack all their cement in 50 kilo sacks, equivalent to 110 lbs.

Transportation difficulties have prevented the cement companies from being able to reach the coast, but this has so much improved lately that there will probably be very little cement imported into the country from now on; although European manufacturers are trying to dump their surplus output on the coast. These manufacturers take advantage of extraordinary low freight rates from Europe in ships which would otherwise have to come over in ballast.

The great increase in the production of Mexican mills, during the last few months, amounting to at least 400 per cent, will no doubt stimulate the use of this material for construction. The increased output

from the mills, and better railroad facilities will also enable manufacturers to quote lower prices.

The prospects for the consumer of cement are very bright compared with recent years, and the manufacturers expect to see a large increase in concrete construction, and the use of cement on a small scale on farms, and in the home.

## Cement Industry in the Philippines

THE town of Naga, in the Island of Cebu, is now conceded as the best field for a cement industry in the Philippines, according to the Bureau of Science, Manila. Both the chemical and grinding tests on raw cement material produced in the field have been highly successful and point to the feasibility of a cement venture on a large scale.

The field is situated near coal mines from which a suitable supply of fuel may be run to the cement plant by gravity.

The National Cement Co., mostly owned by the Government, will in a short time erect a cement plant in this locality, it is reported.

Cement's rapid and steady economic progress, the abundance of raw material and other manufacturing advantages—all offer strong possibilities of development as an industry in the Philippines.

The raw materials needed in this industry are widely distributed in nearly all of the islands of the archipelago. Among the most important of these are the calcareous materials, which include pure and hard limestones, and the argillaceous materials, which include shales, residual and transported clays and volcanic tuff.

A cement company, if run on a sound business basis and with sufficient capital to tide it over for several years, without resorting to heavy borrowing for the first few years of operation, would have excellent prospects, taking into consideration the numerous advantages which local conditions have to offer to the industry.

Experience has demonstrated that cement as a construction material meets successfully the exigencies of climatic and geologic conditions of the Philippine islands, as attested by its use in almost all permanent structures erected by the government and private individuals, says an exchange.

# A Mountain of Gypsum

**Imperial Gypsum and Oil Company Starts Construction at Maria, California, Reported to Be Most Remarkable Gypsum Plant in the World**

**A**CTIVE WORK of construction on the 18 miles of railroad from Maria, a little station on the San Diego & Arizona Railroad, in Imperial County, to the gypsum mines of the Imperial Gypsum Co. has been started.

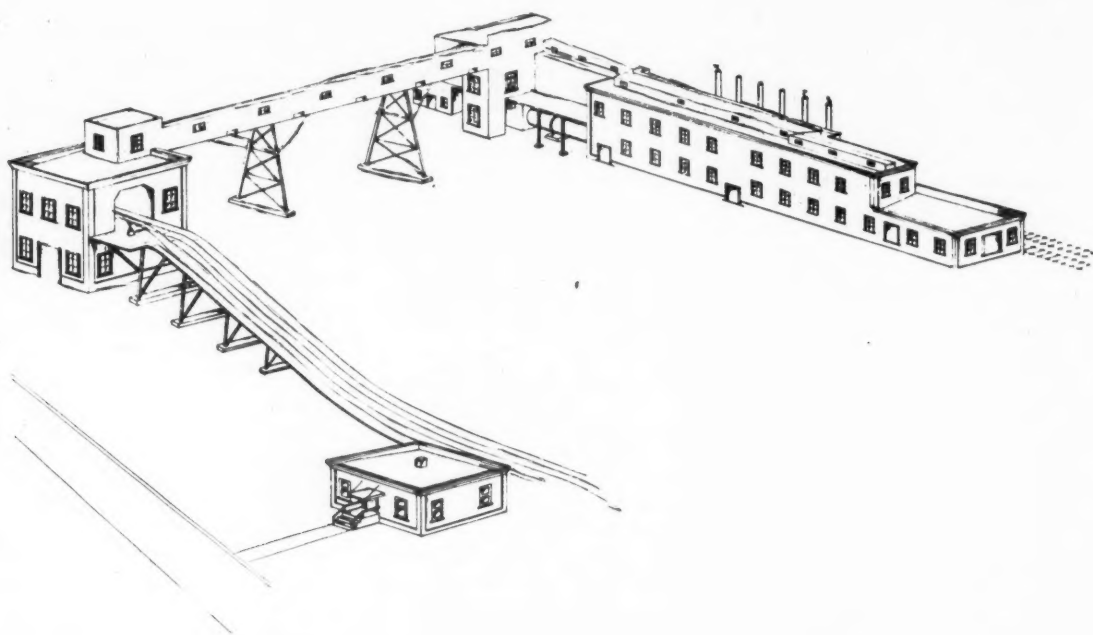
The property of the Imperial Valley Gypsum & Oil Co. comprises about 400

10,000 tons of wall and casting plaster and San Francisco a similar amount, or a total sum of \$300,000 per month is expended by these two cities for this product, it is claimed.

Refining and manufacturing plants of the company will be built at Maria as will also the company warehouses. Equipment at

and smaller, ready for grinding for land plaster and wall plaster.

There will be storage available for 15,000 tons of crushed gypsum. The mill machinery will include grinding and sacking equipment for 100 tons of land plaster for agricultural purposes daily, separately installed from the wall plaster plant.



Bird's-eye view of Imperial Gypsum and Oil Company's plant

acres lying approximately 28 miles west from Westmoreland or approximately 25 miles north of Maria from which point the connection of the company's railroad to the main line of the S. D. & A. is being made.

Government mining engineers have estimated the deposit of gypsum to be near 600,000,000 tons which is said to be the largest known quantity of pure gypsum in any one deposit in the country. Laboratory tests were made under the supervision of the Government at Washington, D. C., showing the rock to analyze 97 to 99.1 pure gypsum, being remarkably free from foreign substances of any kind.

With such a tremendous supply of gypsum at their disposal, officials of the company expect to be able to supply practically the entire demand of the Pacific Coast and the Orient. Recent figures show that the city of Los Angeles consumes monthly

the mines will handle 1,000 tons per day while the plant will turn out 500 tons of finished plaster. The plant when running at capacity will provide employment for upwards of 100 skilled laborers with a daily payroll of nearly \$1,000.

The main plant will be built at a total cost of \$175,000 to which will be added later a hollow tile block factory and a wall board factory. Some 170 acres have been secured for the site of the factory and a townsite where homes will be built for the men employed.

The complete plant is being designed by J. B. Ehrsam & Sons Mfg. Co., of Enterprise, Kan. The crushing plant will consist of one 34x48-in. jaw crusher. This will handle the gypsum rock as it arrives from the mines, breaking it to 6 in. and smaller. From this it will pass to a rotary crusher which will reduce it to ¾-in. pebble

The wall plaster equipment will include one dryer, capacity 40 tons per hour, ten 42-in. horizontal Burr mills, five kettles 12 ft. dia., three screens, two double paddle plaster mixers with hopper scales and automatic trips, etc.

All the machinery, conveyors and elevators will be driven by electric motors avoiding the use of line shafts and counter shafts, thus reducing power consumption to a minimum. The electricity will be furnished by the Southern Sierra's Power Co. The company plans the erection of a number of comfortable homes for the workmen.

The head offices of the company are located in the Spreckles building at San Diego with branch offices in the Dunaway building, El Centro, Calif. S. W. Dunaway is general manager of the company.



Mountain of solid gypsum rock

## Improved Labor Conditions in the Fort Dodge Gypsum District

(Editorial Correspondence)

**A**LTHOUGH not settled, the strike situation at Fort Dodge is well under control. The miners, who went on strike on July 1, are still striking, while the mill men are operating today under the open-shop principle.

It seems that the miners and laborers in the Fort Dodge gypsum district had one of the strongest unions in the country. For the past ten years it has been their custom to make the gypsum manufacturers in the district sign a contract every year on July 1, in which the miners made their demands as to wages, working rules, etc. This condition practically put the miners in control of the entire situation; the mill men had no say whatsoever.

Whenever a dispute arose and the mill men balked at certain things, the miners would threaten to walk out. They never gave the slightest consideration to the business of the mills or to what their action would mean. The mill men could not hire or fire their men without first getting permission from the miners' officials. While there was an arbitration board, made up of miners and mill men, the result of any difference between the miners and the mill men was invariably in favor of the miners' union. The board majority sided with the men.

Accordingly, on July 1, 1921, the manufacturers in the district decided not to

sign any more contracts with the union. They gave the union a week's notice to the effect that after that time the mills would operate under the open-shop principle. The union, previous to that time, had demanded the same wages as in the previous year, but the manufacturers could not meet this demand and still lower the price on gypsum products.

Then again, the manufacturers were getting anything but efficient service and satisfaction from the men—they loafed on their jobs and their work was sloppy and haphazard. However, the main cause of the strike was not a question of wages, for all of the companies want to see that the men live decently and are in a position to save money. The real issue was for an open shop.

Thus the strike started after the week's notice given on July 1, and all the mills were closed for a period of ten weeks. This happened just about the time when the gypsum mills were operating at their peak capacity; therefore the loss to the manufacturers was great.

At the end of the ten weeks the gypsum mills reopened with a complete force of non-union men. These new men were first induced to strike by the union men. Then they were later threatened, if they wouldn't strike, and at last the strikers gave vent to some violence, including gun

play, although this was stopped very quickly. The companies at the present time still guard their employees and their plants.

These union men, about 1200 in number, are still stubborn—still holding out. They are at the present time encamped with their families on the banks of the Des Moines River, and each man receives \$6 a week from the union. It is said from good authority that the union is at the end of its finances and that the city of Fort Dodge will presently find itself with 1200 men on its hands to feed and to shelter. The winter season is rapidly approaching and there are places aplenty more comfortable to live in than being encamped on the banks of the river.

The gypsum mills today are operating with an open shop and are taking care of their customers immediately upon receipt of their orders. The season has not been a profitable one as the strike came on right in the middle of the busy season and also when the mills had just opened up after lying dormant all winter.

All of the manufacturers are very optimistic in looking forward to a good season in 1922. To make it realistic, some manufacturers declare that, should the freight rates be lowered, the year of 1922 will prove to be their peak and banner year.

C. A. B.



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## Editorial Comment

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The very interesting article elsewhere in this issue on the relative merits of lime and caustic soda for cotton bleaching exemplifies, perhaps better than anything previously published, the great need for the kind of research work the National Lime Association now has under way. Old-time methods using lime have frequently been replaced, and now on second thought chemists are beginning to wonder if a real improvement has been made. Maybe objections to the use of lime could have been overcome and all the advantages retained at the same time. In this particular case lime is used anyway, because you can't make caustic soda without lime, or limestone. About a fourth of all the lime produced is so used. But this lime is not produced by commercial lime manufacturers to any extent.

For every ton of lime "burned" almost a ton of carbon dioxide—CO<sub>2</sub>—goes up in smoke. Except in a few instances where limestone or magnesite is burned especially for the CO<sub>2</sub>, no attempt is made to recover and market this material. It has a number of industrial applications, the best known of which is for carbonated beverages or soda water. For such purposes it has to be purified, and its recovery and production is an industry of itself.

However, should the use of CO<sub>2</sub> in agriculture develop as German experimenters seem to have reason to believe, not only would the market for the material be greatly enlarged, but a much less pure form would be required—a form that very likely any lime plant could furnish in abundance.

The possibilities of development along these lines are really wonderful. The German experimenter sees the day when plants furnishing CO<sub>2</sub> gas will pipe the material to surrounding agricultural territory much as illuminating gas and electricity are furnished today. It is a subject worth a little study and some dreaming.

Is there any excuse for the present variety of freight rates on sand, gravel and crushed stone? Any discussion of rates by producers of these materials inevitably brings out the discrepancies in hauls of comparable length, that seem on the face of it unjustifiable. Any concerted action on the part of producers for lower rates is always complicated by this utter lack of any uniformity and system in the majority of rates on these commodities. Any real revision of freight rates must take this matter into consideration, and it is difficult to see how such a revision can be made without resulting in more uniformity than now.

A letter from a Pennsylvania sand producer very well expresses the attitude of many other producers:

We feel that the railroad companies are playing a very inconsistent game, and that they are able to do so only because the sand manufacturers have not gone after them systematically.

What we have in mind especially is that they will haul sand a certain number of miles for a certain rate in one district and in another will haul the same commodity a very much less number of miles at a higher rate. In one district they are making an effort to have sand producers meet competition—in another district they are making no effort at all.

We would like to see a questionnaire sent to all the manufacturers—classifying the business into lake, river and crushed rock sand. Let each fellow take his principal points of shipment, state the number of miles haul and the rate which he is being charged. Have these all tabulated to show the inconsistencies of the railroads and then publish it broadcast. Send it to all the newspapers that will publish it and show the railroads in their true light. In this way we may get something.

As it is the railroads are peddling their propaganda at every turn and getting away with it. The sand producers are simply sitting back and being imposed upon.

The last statement is not altogether exact. The sand and gravel producers are very far from sitting back and being unresistingly imposed upon. The National Association of Sand and Gravel Producers is at present, and has been for a long time, very active along just such lines. The Association has already collected much of the data the writer of the above letter has in mind.

But as to publishing such data broadcast in the newspapers, that is another proposition. In the first place few newspapers would publish it, for the simple reason that it lacks the essential element of "news." In the second place producers who have low rates in particular instances are not going to boast about them. If they did there is more reason to believe their rates would be raised than the other fellow's lowered.

Maybe, for the good of the whole industry, some of these low rates should be increased. And many rates of long standing are still low, on a comparative mileage basis, with rates of more recent origin. As the writer of the above letter states, many rates are based on competitive conditions, while others are not. Yet shippers are continually insisting that whatever is done with railway freight rates, existing, or rather previously existing, relationships must be preserved.

The problem is one of the hardest ever tackled by an organization of producers. There are many arguments both for and against mileage rates, or uniformity in rates, on sand, gravel and crushed stone. Nothing is to be gained by dodging this issue at the coming conventions of the industry. A great deal is to be gained by thrashing the matter out among themselves, before the Interstate Commerce Commission or some other body is brought face to face with it. The issue has been side-stepped for a long time. Let's face it.



# Accident Prevention

## Transmission Shafting

Prepared by the Engineering Department of the National Safety Council

**G**UARDS consisting of framework with mesh or plate filling will vary as to strength of material used, according to the area of the guard.

If the guard is 6 ft. in height and fastened to the floor without other support or bracing the metal frame of the guard should have a section at least equal to that of  $1\frac{1}{4} \times 1\frac{1}{4} \times \frac{1}{8}$  in. angle iron. The filling material is usually attached to an angle frame by means of  $\frac{3}{4} \times \frac{1}{2}$  in. flats fastened to the angle by  $\frac{3}{16}$  in. bolts or rivets, spaced not more than 10 in. centers, or by  $1 \times 1$  in. wooden strips fastened to angle by  $\frac{3}{16}$  in. bolts. Perforated or sheet metal is bolted or riveted directly to the angle or spot welded. For a pipe from a  $1\frac{1}{4}$  in. open seam tube is recommended with the filler clamped in the seam of the tubing. When the dimensions of the guard are not more than 3 ft., or where it is braced every 3 ft., the frame should be equivalent in strength to  $\frac{3}{4} \times \frac{3}{4} \times \frac{1}{2}$  in. angle iron, or  $\frac{3}{4}$  in. open seam tubing.

### Filler

Filling material should not have openings larger than  $\frac{1}{2}$  in. when the guard is placed within 6 in. of a moving part, nor larger than  $1\frac{1}{2}$  in. when more than 6 in. and less than 15 in. from the moving part.

When the area of the guard between braces is  $4 \times 4$  ft. it is recommended that wire mesh be at least No. 12 U. S. gauge,  $1\frac{1}{2}$  in. mesh or perforated or sheet metal of at least No. 14 gauge, but No. 10 gauge is recommended when guards will be subjected to hard bumps.

No. 16 gauge, perforated or sheet metal will make a substantial filler when the area between stiffeners does not exceed  $3 \times 3$  ft.

The filler used for smaller areas may well be of smaller gauge, but we do not believe a gauge smaller than No. 18 should be used because of the short life of guards of lighter construction.

All guards should be substantially fastened in place and where it is necessary to have access to machinery, portions of the guard should be arranged to swing or slide.

All sharp edges of filler should be protected and where hand holes are provided the edges should be reinforced by at least No. 24 gauge sheet metal, but No. 18 gauge is recommended. When a

gate or door is required, it is recommended that the frame be at least equal to  $1 \times \frac{5}{8} \times \frac{1}{8}$  in. angle, and that means be provided to hold it securely in place.

Care should be exercised in the design of guards to provide convenient access to parts which must be repaired or maintained. This may be done by making the guards movable or by providing doors or removable panels.

## Fire Causes and Prevention

No. 1.—Prepared by the Engineering Department of the National Safety Council

**T**HE loss caused by fire in the United States has been increasing steadily in recent years, and is now estimated to have reached the enormous total of \$300,-

### A Safety Campaign for a Year for 2 Cents a Month!

**D**ID you ever stop to realize what a Safety Calendar would do for you in the homes of your employees—a safety "bulletin" automatically changed each month! Several hundred thousand Safety Calendars have been so used in the last few years.

**D**ID you ever stop to think of the fact that a sure way to reach your workmen is through their wives and children? The Safety Calendar will interest the whole family.

**D**ID you ever stop to think that public opinion is moulded by the intimate talk in the home? The Safety Calendar will influence your employees and their families in habits of Safety.

**D**ID you ever stop to realize that humorous pictures are a universal language? The Safety Calendar carries its lesson to men and women, old and young, of all nationalities and all degrees of education.

**A** NOTE on your letterhead will bring a sample copy. Write today.

### National Safety Council

Co-operative—Non-commercial  
168 North Michigan Avenue, Chicago, Ill.

000,000. The property loss every year is approximately three times the annual production of gold and silver. At least two-thirds of this property loss and of the attendant loss of life is preventable.

The prevention of fire depends upon the elimination of conditions which are likely to cause fire. Only common fire causes—those likely to be met with in any manufacturing plant—will be dealt with and these will be considered under the following main divisions:

- (a) Power Generation
- (b) Power Transmission (mechanical)
- (c) Electricity
- (d) Heating Apparatus
- (e) Gases

(f) Oils, Paints, and Other Inflammable Liquids

(g) Housekeeping

(h) Matches and Smoking

## Power Generation

**Boiler Rooms**—Comparatively few fires originate within boiler rooms except from some easily remedied cause such as piles of refuse, hot ashes in wooden barrels, and the like. Boiler rooms are ordinarily constructed throughout of fireproof material and, in the case of high-pressure boilers, usually placed in a separate building away from the main plant buildings.

It is inadvisable to place wooden boards or wooden foot walks over boiler settings, or in fact, any construction of wood near the boilers. Foot walks and stairs or ladders for access to them should be of steel construction. If boiler rooms are kept clean and the accumulation of rubbish and inflammable material prevented, there is not much chance of fire starting.

**Burning Refuse**—Wherever refuse, sweepings, and waste such as trimmings and lint is burned under boilers, it should be burned promptly when received and not permitted to remain stored in the boiler room. There is danger in mixing such waste with coal, even in small quantities, unless it is to be burned immediately. If such material is stored, it should be placed in a fireproof bin or vault outside of the boiler room proper.

**Coal**—Fire often starts in soft coal storage, therefore it is not advisable to store coal against wooden walls, nor in quantities inside of buildings. The storage places should preferably be removed from buildings and only an amount sufficient for immediate needs kept in boiler room and this not piled near the boilers. Ventilating tunnels, of metal, placed at intervals of 15 to 20 feet have been suggested to prevent fire starting in coal storage piles. Where stokers are used, it is, of course, necessary to store a supply of coal in hoppers over the stokers. This is kept in motion so that there is little danger of combustion starting.

**Ashes**—Only metal containers should be used for the removal of ashes, and the ashes should be kept in metal bins or piled, preferably on a concrete floor. The ash pile should not be adjacent to wooden structures or other inflammable material. The throwing of waste and refuse matter into ash piles, or when removing them from boiler houses often leads to fire. Such material may become ignited from heat in the ashes and a fire may result.

(To be continued.)

# News

## Atlanta Freight-Rate Meeting of Southern Producers

THERE WAS a large attendance of producers of sand and gravel and crushed stone at the Atlanta, Ga., meeting on October 3, backed to the limit by the National Association, to fight the Southern Railway's proposed mileage scale.

The Southeastern Freight Rate Committee held a hearing as to the proposed scale on the following day, and the producers, knowing what they wanted, demanded some measure of justice from the railway company.

A. P. Burke of the Atlanta Sand and Supply Co. called the meeting to order at the Piedmont Hotel at 10:30 in the morning. He paid a warm tribute to the National Association for its work and closed with an eloquent appeal for the moral and financial support of all Southern producers.

The National Association has taken an active interest in this hearing and was represented at both the preliminary meeting and the hearing on the following day. Among those who spoke at the hearing were President Johnston, Executive Secretary E. Guy Sutton and Traffic Representative Edwin Brooker.

Mr. Johnston told the meeting that the sand and gravel industry had not yet fully appreciated the necessity for 100 per cent organization, but that it was fast learning. He emphasized the National Association's possibilities and what membership in it meant.

Mr. Sutton related the association's activities in securing a general freight rate reduction, spoke of the coming formal hearing before the Interstate Commerce Commission, and referred to the possibility of another car shortage. He pointed out that conditions have been reversed since the time of the war-time car priorities orders. Then the government discouraged all highway construction. Now, as a means of relieving the unemployment situation, it wishes to aid, realizing that lower freight rates and adequate car supply for road-building materials will be important factors in making effective this belief.

W. F. Rucker of Mississippi said that the National was the medium through which an adjustment of rates in Mississippi had been secured, and spoke of the grossly unjust freight charges on sand and gravel in his state as compared with other heavy loading commodities.

Charles L. Ruffin of Virginia told of road construction in his state and of how

valuable the National Association is to him. "To attempt to continue in business without the association," said he, "is as great a folly as to be in business and carry no insurance."

Remarks were also made by Walter Lane Smith of Memphis, T. L. Weston of Columbia, S. C.; H. B. Springer of Chattanooga, Thomas McCroskey of Knoxville, Walter S. Holmes of Chattanooga, J. L. Harris of Knoxville, and others.

Milton McDermott of Knoxville said his returns from the National were most gratifying; that he felt he could afford to pay the dues of five other producers who might hesitate about joining and still feel that his investment would be highly profitable.

At the afternoon session Edwin Brooker, traffic representative of the National Association, explained just what was contemplated under the Southern Railway's proposed scale, and gave the producers detailed information as to how it affected present rates. His arguments as to why the producers were entitled to a much lower basis than proposed were conclusive. The effect of the minimum weight and average loading on the level of the rates per ton, analyzed from the standpoint of costs of both terminal and road haul service, were also explained by Mr. Brooker.

## Middle West Sand and Gravel Producers to Confer with Central Freight Association

AT the conference of the producers of sand and gravel of the various central states and the Central Freight Association committee is to be held in Chicago on Nov. 10. This conference marks the culmination of many months of effort on the part of the National Association of Sand and Gravel Producers, the various local associations and many individuals to get justice from the railway traffic men of the Middle West. E. Brooker, traffic manager of the National Association, is preparing the presentation of the case for the producers, and every producer is urged to give him all the data he needs and to be present and help the cause in every way.

A preliminary meeting of the producers of the four states of Michigan, Ohio, Illinois and Indiana will probably be called by the National Association for Nov. 9.

## Rate Reductions on Sand-Gravel and Crushed Stone in East

REDUCTION in rates on sand and gravel and crushed stone between practically all points in trunk line territory, including Pennsylvania, New Jersey, Delaware, Maryland and portions of West Virginia and Virginia have become effective since October 1. The basis employed in constructing the reduced rates is 15 per cent higher than the rates in effect prior to the general increase of August, 1920, thus substituting a 15 per cent increase for a 40 per cent increase. It is expected that the annual reduction in transportation charges on the commodities affected will be much in excess of \$1,000,000.—*Traffic World*.

## Evansville Sand & Gravel Co. Adds New Plant

AS THE sand and gravel in the vicinity of Evansville, Ind., will not pass the rigid Indiana specifications for concrete roads, the Evansville Sand & Gravel Co. has added a new plant at Rockport, the gravel from which will pass all specifications. This plant will have a capacity of 1,000 tons per day.

The company now operates four plants, at Evansville, Mount Vernon, Rockport, Ind., and Henderson, Ky.

## St. Paul Road Orders 2500 New Gondolas

IT WAS ANNOUNCED on November 3 that the Chicago, Milwaukee & St. Paul Railroad had placed an order for 2500 new steel gondola cars, at a cost of \$4,500,000. This is the largest contract for rolling stock made since the railroads returned to private ownership.

This new equipment will undoubtedly be of material benefit to the mineral aggregate traffic as the St. Paul has been notoriously short of this equipment and has therefore hindered the development of the sand, gravel and crushed stone industry, particularly in Wisconsin.

## High Price for State Crushed Stone

MOSCOW, Idaho, has signed a contract for a Spokane, Wash., company to furnish crushed stone for two filters for its septic tank. The contract calls for the delivery of 2,000 cubic yards of stone from the state quarry near Moscow at \$4 a cubic yard.

# Rock Products Exhibit at Mining Exposition



Rock Products exhibit at the National Exposition of Mines and Mining Equipment

THE exhibit of rock products at the National Exposition of Mines and Mining Equipment in Chicago the week of October 17, proved a popular one and also helped toward putting the rock products industries on the same map with metal and coal mining. The exhibit, as the accompanying photograph shows, was both instructive and educational, especially to men whose idea of mines and mining is made up of the so-called "mining industries."

It proved to the other mining interests that the rock products industry is one of considerable magnitude and also proved to be an "eye opener" to the general public which is not acquainted with the importance and magnitude of the rock products enterprises.

The feature part of the exhibit was a collection of various minerals produced in the rock products industries, the manufactured products and the by-products, such as potash recovered from waste gases in cement manufacture. Samples were shown of all the various steps in the manufacture of cement, lime and gypsum.

## Truck Haul From Quarries Increasing

TRUCK haul tonnage from quarry plants is increasing. At a recent Mid-West quarrymen's conference this fact developed: "That in 1921 trucks had hauled 35 per cent of the plant output. This was an increase from 5 per cent in

1916 to 35 per cent in 1921. Excessive freight rates were given as one of the causes. Uncertain car service a second cause. Cheaper delivery at point of use or distribution a third cause. Quicker delivery a fourth cause. One argument against too long a truck haul was the ruin of roads by heavy loads. These facts were brought out in a discussion as to whether or not a law limiting the combined weight of a truck and its load to ten tons should be repealed. Argument was made for its repeal on the grounds that roads should be made thick enough to carry any load that anybody desired to haul over it. Others argued that such a policy would rob railroads of business rightfully belonging to them, etc."—*National Crushed Stone Association Bulletin*.



# New Machinery and Equipment

## Hardinge System of Pulverizing Fuels

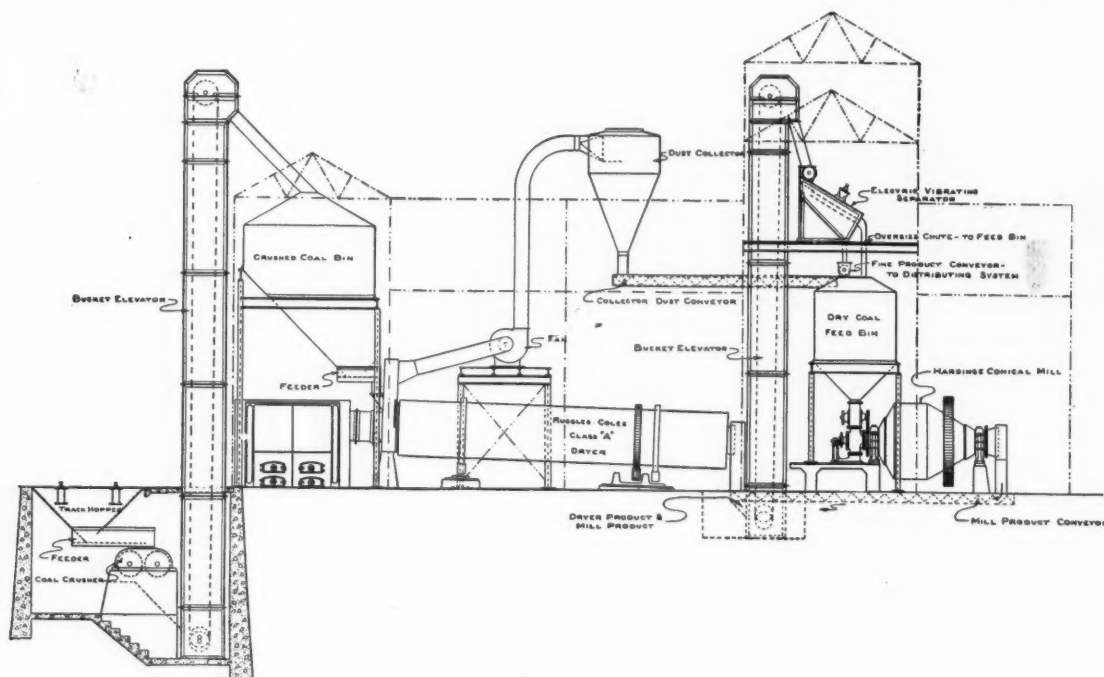
A bulletin entitled "Pulverized Fuels" has just been published by the Hardinge Company, 720 Broadway, New York City. This bulletin is known as their No. 19 catalogue. The adoption of the Hardinge mill for pulverized fuels is comparatively recent, according to their own statement, as follows:

so rapid in the last few years. These reasons are:

- a—The increased efficiency of combustion.
- b—The utilization of fuels which would otherwise be wasted or be very inefficiently burned.
- c—Flexibility of operation and ease of handling, making it possible to control the burning within a wide range on short notice.

oversize of from 65 to 150 mesh, depending upon the character of fuel, is eliminated, "sparking" ceases, and when this oversize is eliminated, by a satisfactory means, it is not necessary to grind to a degree of fineness which was at one time thought necessary.

Under the subject "The Hardinge Mill," the general principle of grinding is discussed, with special reference to stage reduction, elimination of the fine

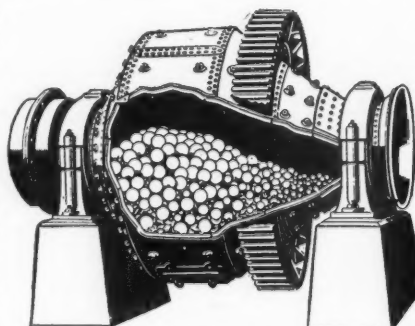


Typical plant layout embodying Hardinge system in pulverizing fields

"The Hardinge conical mill, although only recently applied to this field, has been fully demonstrated as a most satisfactory unit for pulverizing solid fuels. The results obtained are a continuation of the remarkable record of the Hardinge mill in the mining and industrial grinding fields, as evidenced by the fact that over 70,000,000 tons of friable materials are being ground per year in Hardinge mills alone."

This bulletin is divided into three main sections, viz., the application of pulverized fuel to various burning problems, the principle of operation of the Hardinge mill and a discussion of the application of the Hardinge system for pulverizing fuels.

Under the heading of "Pulverized Fuel" three principal causes are mentioned why the advance of this class of fuel has been



Manner in which balls segregate during operation of mill

In the general discussion of pulverized fuel where the Hardinge system is used emphasis is laid on the point of "sparking" during the burning process. They emphasize the point that when coarse

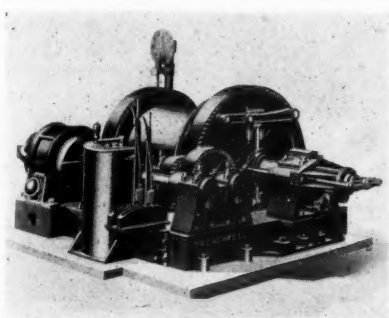
particles as soon as produced and the proportioning of energy to the work required. The different types of Hardinge mills and the details of their construction are also discussed in this section, and special reference is made of the advantages of the conical mill when used for pulverized fuels of widely different character.

Under "Pulverized Fuel Installations," a complete pulverized fuel plant is outlined, which includes the feeding of the coal from the track hopper to the crushers, dryer, mill, separator and distribution system. There is also taken up different arrangements of the mill and separator which would be used according to the special requirements. In addition, there is given a table showing the general dimensions of the different sizes of Hardinge mills, so that it is possible to

make a rough estimate of the floor space required for each unit.

### Treadwell Engineering Co. New Line of Hoists

ROCK PRODUCTS producers will be interested in learning that the Treadwell Engineering Co., of Easton, Pa., has placed on the market a new line of hoists, both steam and electric driven. The company, while a long-established and well-known manufacturer of rolling-mill equipment, has not hitherto been so closely identified with the rock products field. The company feels that it has been fortunate in securing the services of Thomas O. Werner as chief engineer of its hoist department. Mr. Werner is



New line of hoists

widely known as a hoist expert, having been associated with the S. Flory Manufacturing Co. in a similar capacity for many years. Among the features which distinguish these new hoists is a double-toggle clutch mechanism which is claimed to be a step forward in design. The clutch is usually mechanically operated by a double-acting cylinder, although it can be arranged for hand operation if desired. A point is made of the fact that the clutch (of the hand-type) drives directly from the rim of the main gear, which carries the driving portion of the clutch to the friction-flange of the drum. The construction necessarily eliminates any torsional stress in the drum-shaft and end-strain or thrust in the bearings or operating mechanism, for when brought into play this device is automatically locked. The company is building a complete line and is prepared to offer a machine to meet practically any operating conditions within a range of from 100 to 300 h.p. These hoists can be arranged for either electric-motor or steam-engine drive.

### New Flory Room Hoist

A NEW type of room hoist for mines and for light car haulage has recently been developed by the S. Flory Manufacturing Co., Bangor, Pa. The hoist is a single drum type, the drum be-

ing made of cast iron and cast integral with the main gear. The drum and gear are keyed to the drumshaft. The intermediate shaft is equipped with a sliding pinion which is thrown in and out of gear with the main gear and the drumshaft as desired, thus actuating from stopping the rotative movement of the drum. This sliding pinion is operated by a lever in a quadrant.

The bedplate is a single casting and heavily ribbed with the bearing housings cast integral with the same; the bearings are babbitted. The main drum gear and pinion are of semi-steel with moulded teeth. The motor pinion is of forged steel and the gear, which engages with same of semi-steel, both have machine cut teeth.

The drum is 8 in. in diameter, 13½ in. long between flanges; ratio of gearing and sizes of shafts are well-proportioned for the duty imposed.

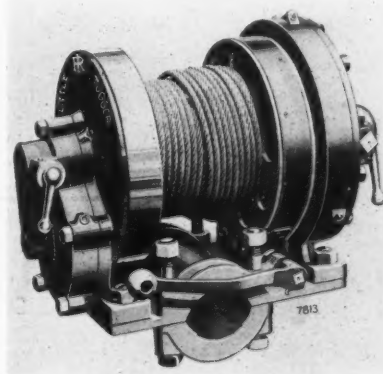
The motor may be alternating or direct current and of size to meet operating conditions generally 3 or 5 h.p. A motor is usually started by using a knife switch and drawing the current across the line. Drum controller can be supplied when desired.

The overall dimensions are 2 ft. 9 in. wide, 3 ft. 6 in. long and 2 ft. 5 in. high, with an approximate total weight of 900 lb. The base may be bolted to wooden skids for convenience in moving the hoist around.

### The "Little Tugger" Derrick

NECESSITY recently caused the invention of an inexpensive derrick and, at the same time, showed another novel use of the "Little Tugger" hoists, manufactured by the Ingersoll-Rand Co., 11 Broadway, New York City.

Fire gutted the 600-ton mill of the Silver King Coalition Mines Co. This mill concentrated the ores from the company's various mines which are located

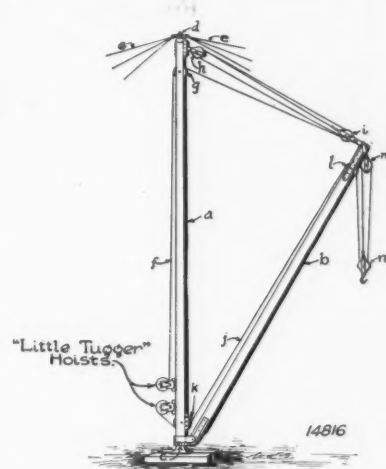


Little Tugger hoist

along the strike of the ore zone at Park City, Utah, about 35 miles southeast of Salt Lake City.

Two "Little Tugger" hoists were used in the construction of the derrick for clearing away the debris to make room for the new mill which is to be erected. This derrick was used to lift all of the heavy material.

Following is a description of the derrick and the work.



The "Little Tugger" derrick

The mast, "a," and the boom, "b," were both made from telegraph poles. The mast is carried at the foot by the pivot, "d," held by the guy ropes, "e." The boom is pivoted at the lower end of the mast. The rope, "f," is connected with the upper hoist and passes over the sheave, "g," at the top of the mast and through the pulley, "h," at the mast head and, "i," at the top of the boom. This rope varies the angle of the boom.

The hoisting rope, "j," is connected with the lower hoist and passes under the sheave, "k," on the mast, over sheave, "l," on the boom and through the pulleys, "m" and "n." This is the rope which suspends the load.

The derrick is swung by hand, although another "Little Tugger" could do this work also if it were desired. In this case the derrick would have to be furnished with a bull-wheel.

### Lime Association Opens New Branch Office at Springfield, Mass.

IN THE INTEREST of greater agricultural production through the use of lime and regulated soil treatment, the Eastern Bureau of the National Lime Association has established a branch headquarters in Springfield, Mass. The work will be conducted in co-operation with the agricultural college and other educational institutions of New England.

R. C. Parker, formerly associated with the Cornell University Extension Service, will be the technician in charge.

# The Rock Products Market

## Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

### Crushed Limestone

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
<b>EASTERN:</b>						
Buffalo, N. Y.	1.00	1.30 per net ton, all sizes	2.50	2.00	2.00	2.50
Burlington, N. Y.	1.00	1.75	1.75	1.25	1.25	1.25
Chaumont, N. Y.	1.25	1.25	1.15	1.15	1.15	1.15
Cobleskill, N. Y.		1.50 per net ton, all sizes	1.60	1.60	1.60	1.50
Coldwater, N. Y.	.75	1.60	1.75	1.50	1.50	1.50
Eastern New York	1.00	1.75	1.60	1.60	1.60	1.60
Eastern Penna.	1.00	1.25	1.25	1.25	1.25	1.25
Walford, Pa.	.70					
Western New York						
<b>CENTRAL:</b>						
Alden, Ia.	.80@1.00	.80@1.00	1.50	1.45		
Alton, Ill.	2.00		1.50	1.40	1.35	
Bettendorf, Ia.		All sizes, 2.00 cu. yd. f.o.b. quarry	1.40	1.25	1.30	
Buffalo, Iowa	1.00	1.40	1.40	1.00	1.00	1.00
Chicago, Ill.	1.00	1.40	1.50	1.50	1.25	1.20
Dundas, Ont.	1.00	1.30	1.30	1.30	1.30	1.30
Eden and Knowles, Wis.	1.30					
Faribault, Minn.					2.00	
Greencastle, Ind.	1.25@1.35	1.25	1.10	1.10	1.10	1.10
Illinois, Southern	1.75	1.60	1.50	1.50	1.40	
Kokomo, Ind.	1.10	1.25	1.25	1.10	1.10	1.10
Krause or Columbia, Ill.	1.50	1.20	1.25	1.20	1.20	1.20
Lannon, Wis.	.90	1.00	1.00	1.00	1.00	1.00
Marblehead and Brillion, Wis.	1.10		1.20	1.10	1.10	1.10
Montrose, Ia.	1.35@1.50	1.50	1.50@1.60	1.50	1.50	1.50
Oshkosh, Wis.			1.40 per net ton, all sizes			
Sheboygan, Wis.	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10
Southern Illinois	1.50	1.40	1.40	1.40	1.35	
Stolle, Ill. (I. C. R. R.)	1.75	1.60	1.60	1.50	1.50	1.50
Stone City, Iowa	.50		1.40	1.35	1.30	
Toledo, Ohio	1.84	1.99	1.99	1.99	1.84	1.84
Toronto, Canada	1.90	2.40	2.40	2.15	2.15	2.10@2.15
Valmeyer, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
<b>SOUTHERN:</b>						
Cartersville, Ga.		2.00		1.25	1.25	
Chickamauga, Tenn.	1.10	1.00	1.00	1.00	.93	
Dallas, Texas	1.10	1.25	1.25	1.25	1.25	1.10
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	
Fort Springs, W. Va.	1.35	1.65	2.00	1.60	1.50	1.45
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	
Ladds, Ga.	1.25			1.25	1.25	1.25
Morris Spur (near Dallas) Tex.	1.10	1.25	1.25	1.25	1.25	1.25
Portland, Ga.	.60@1.00		(All other sizes 1.00@1.25)			
Shepherd, Tenn.	1.00@1.25	1.00@1.25	1.00@1.25	.75@1.00	.75@1.00	
<b>WESTERN:</b>						
Atchison, Kans.	.50	2.10	2.10	2.10	2.10	2.10
Blue Springs and Wymore, Neb.	.20	(Rip-rap, 1.65	1.80 per ton)	1.55@1.60	1.45@1.50	1.40
Bromide, Okla.	.60	1.50	1.50	1.50	1.30	1.30
Cape Girardeau, Mo.	1.50		1.50	1.50	1.25	
Kansas City, Mo.	1.00	1.80	2.00	2.00	2.00	2.00

### Crushed Trap Rock

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md.	1.25	2.50	2.35	2.25	2.00@2.25	2.00
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	
Branford, Conn.	.60	1.50	1.25	1.15	1.10	
Bound Brook, N. J.	2.00	2.20	2.00	1.70	1.60	
Dresser Jct., Wis.	1.00	2.25	2.25	2.00	1.75	1.75
Duluth, Minn.	.75@1.00	2.25	1.90@2.00	1.35@1.50	1.35@1.50	1.35@1.50
Dwight Station, Calif.			.75@1.00—all sizes			
E. Summit, N. J.	2.10	2.35	2.15	1.75	1.75	
Eastern Mass.	.60	1.95	1.75	1.50	1.50	1.50
Eastern New York	1.00	1.80	1.70	1.50	1.50	1.50
Eastern Penna.	1.25	1.90	1.80	1.60	1.50	1.50
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@.80	1.60@1.75	1.50	1.25	1.10	
Oakland, Calif.	1.75	1.75	1.75	1.50	1.50	1.50
Richmond, Calif.	.50*	1.75*	1.75*	1.50*	1.50*	
San Diego, Calif.	.50@.70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	1.85	2.00	2.00	1.75	1.70	
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	

### Miscellaneous Crushed Stone

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Alexandria Bay, N. Y.	1.60		1.30	1.50	1.20	
Berlin, Wis.	1.35	1.40	1.40	1.50	1.20	
Columbia, S. C.—Granite	.75		2.75	2.50	2.35	
Dell Rapids, S. D.—Granite	.75	2.00	1.50	1.50	1.60	
Dundas, Ont.—Flint	1.00	1.50	1.50	1.50	1.25	1.20
Eastern Penna.—Sandstone	1.00	1.75	1.75	1.50	1.50	1.50
Eastern Penna.—Quartzite	.90	1.60	1.40	1.30	1.30	1.30
Holton, Ga.—Granite	.40		2.50	2.25	2.25	2.00
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30		1.20	
Los Angeles, Cal.—Granite		1.25@1.50	1.15@1.40	1.15@1.40		
Macon, Ga.—Granite	.50		2.50	2.25	2.00	2.00
Middlebrook, Mo.—Granite	3.50@4.00			2.00@2.25		1.50@1.75
Red Granite, Wis.	1.35	1.40	1.30	1.50	1.20	
Sioux Falls, S. D.—Granite	.75	2.00	2.00	2.10	1.60	
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75	
Utley, Wis.	1.35	1.40	1.30	1.50	1.20	

\*Cubic yard. \*Agrl. lime. ||R. R. ballast. §Flux †Rip-rap. ‡3-inch and less.

### Agricultural Limestone

#### EASTERN:

Chaumont, N. Y.—Analysis, 95% CaCO <sub>3</sub> , 1.14% MgCO <sub>3</sub> —Thru 100 mesh; sacks, 4.00; bulk	2.50
Coldwater, N. Y.—Analysis, 56.77% CaCO <sub>3</sub> , 41.74% MgCO <sub>3</sub> , 70% thru 200 mesh, 95% thru 50 mesh, sacks 4.00; bulk	3.00
Grove City, Pa.—Analysis, 94.75% CaCO <sub>3</sub> , 1.20% MgCO <sub>3</sub> —70% thru 100 mesh; 80 lb. ppr., 5.50; bulk	4.50
Hillsville, Pa.—70% thru 100 mesh; sacks, 4.75; bulk	3.00
Jamesville, N. Y.—Analysis, 89.25% CaCO <sub>3</sub> , 5.25% MgCO <sub>3</sub> ; sacks, 4.50; bulk	2.75
New Castle, Pa.—89% CaCO <sub>3</sub> , 1.4% MgCO <sub>3</sub> —75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk	3.00
Texas, Md.—Analysis, 58.02% CaCO <sub>3</sub> , 37.3% MgCO <sub>3</sub> —50% thru 50 mesh; bags, 4.25; bulk	2.50
Walford, Pa.—50% thru 100 mesh, 60% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk	3.00
West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% CaCO <sub>3</sub> —50% thru 100 mesh; paper bags, 5.00—cloth, 5.25; bulk	3.50
Williamsport, Pa.—Analysis, 88-90% CaCO <sub>3</sub> , 3-4% MgCO <sub>3</sub> —50% thru 50 mesh; paper, 5.50; bulk	4.00

#### CENTRAL:

Alden, Ia.—Analysis, 99.16% CaCO <sub>3</sub>	.80
Alton, Ill.—Analysis, 96% CaCO <sub>3</sub> , 0.3% MgCO <sub>3</sub> —90% thru 100 mesh	6.00
Bedford, Ind.—Analysis, 98.5% CaCO <sub>3</sub> , .5% MgCO <sub>3</sub> —90% thru 10 mesh	1.60@2.00
Belleville, Ont.—Analysis, 90.9% CaCO <sub>3</sub> , 1.15% MgCO <sub>3</sub> —45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk	2.50
Bettendorf, Ia.—Analysis, 96.14% CaCO <sub>3</sub> , 2.5% MgCO <sub>3</sub> —50% thru 100 mesh, 2.00; 50% thru 4 mesh	2.00
Buffalo, Ia.—90% thru 4 mesh	1.00
Cape Girardeau, Mo.—Analysis, 93% CaCO <sub>3</sub> , 3.3% MgCO <sub>3</sub> (90% thru 50 mesh, 2.00), 50% thru 4 mesh	1.50
Chicago, Ill.—Analysis, 53.63% CaCO <sub>3</sub> , 37.51% MgCO <sub>3</sub> —90% thru 4 mesh	1.00
Columbia, Ill., near East St. Louis—½-in. down	1.25@1.80
Detroit, Mich.—Analysis, 88% CaCO <sub>3</sub> , 7% MgCO <sub>3</sub> —75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh	1.80@3.80
Elmhurst, Ill.—Analysis, 85.73% CaCO <sub>3</sub> , 20.69% MgCO <sub>3</sub> —50% thru 50 mesh	1.25
Greencastle, Ind.—Analysis, 98% CaCO <sub>3</sub> —50% thru 50 mesh	2.00
Lannon, Wis.—Analysis, 54% CaCO <sub>3</sub> , 44% MgCO <sub>3</sub> —90% thru 50 mesh	2.00
Marblehead, O.—Analysis, 33.42% CaCO <sub>3</sub> , 4.29% MgCO <sub>3</sub> —52.4% thru 100 mesh, 59.4% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk	3.00
Limestone screenings; bulk	1.50
McCook, Ill.—Analysis, 54.10% CaCO <sub>3</sub> , 45.04% MgCO <sub>3</sub> —100% thru ¼-in. sieve, 78.12% thru No. 10, 53.29% thru No. 20, 38.14% thru No. 30, 34.86% thru No. 50, 22% thru 100 mesh	1.50
Milltown, Ind.—Analysis, 93.10% CaCO <sub>3</sub> , 3.2% MgCO <sub>3</sub> —33.2% thru 100 mesh, 40% thru 100 mesh	1.25@1.65
Mitchell, Ind.—50% thru 100 mesh	2.00
Montrose, Ia.—90% thru 100 mesh	1.35
Ohio (different points), 20% thru 100 mesh; bulk	1.25@1.50
Piqua, O.—Analysis, 82.8% CaCO <sub>3</sub> , 8.2% MgCO <sub>3</sub> ; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh	3.25@5.00
50% thru 50 mesh	1.75@2.00
Ridgeville, Ind.—Analysis, 98% CaCO <sub>3</sub> —100% thru 4 mesh	1.75
River Rouge, Mich.—Analysis, 54% CaCO <sub>3</sub> , 40% MgCO <sub>3</sub> ; bulk	.80@1.40
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ¼-in. mesh	
Analysis, 89.61% to 89.91% CaCO <sub>3</sub> , 3.82% MgCO <sub>3</sub>	1.75
Stone City, Ia.—Analysis, 98% CaCO <sub>3</sub> —50% thru 100 mesh	.50
Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh	1.50

(Continued on next page)



## Agricultural Limestone

(Continued from preceding page.)

Whitehill, Ill.—Analysis, 97.12% CaCO <sub>3</sub> , 2.50% MgCO <sub>3</sub> —90% thru 100 mesh.....	5.00
50% thru 100 mesh.....	1.75
Yellow Springs, Ohio—Analysis, 96.08% CaCO <sub>3</sub> , 63% MgCO <sub>3</sub> , 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk.....	4.25
<b>SOUTHERN:</b>	
Barber, Va.—Analysis, 92 to 98% CaCO <sub>3</sub> —Bags, 6.50; bulk.....	4.50
Blowers, Fla.—Analysis, 98% combined carbonates—75% thru 200 mesh.....	4.75
Cartersville, Ga.—Analysis, 96% combined carbonates—pulverized limestone.....	1.75@2.00
Claremont, Va. (Marlime)—Analysis, 90% CaCO <sub>3</sub> , 2% MgCO <sub>3</sub> —(90% thru 100 mesh, \$4.00), 50% thru 100 mesh.....	3.50
Dittlinger, Tex.—Analysis, 99.09% CaCO <sub>3</sub> , 0.4% MgCO <sub>3</sub> —90% thru 100 mesh.....	2.00@3.00
90% thru 4 mesh.....	1.00@2.00
Ft. Springs, W. Va.—50% thru 100 mesh.....	3.00
Grovia, Ga.—Analysis, 95% CaCO <sub>3</sub> , no MgCO <sub>3</sub> —50% thru 100 mesh.....	2.50
Knoxville, Tenn.—Pulverized.....	2.50
90% thru 100 mesh.....	2.00
90% thru 50 mesh.....	1.50
Ladds, Ga.—50% thru 100 mesh.....	2.00
Linnville Falls, N. C.—Analysis, 53% CaCO <sub>3</sub> ; 42% MgCO <sub>3</sub> —50% thru 100 mesh; sacks, 4.50; bulk.....	3.00
Mascot, Tenn.—Analysis 52% CaCO <sub>3</sub> , 38% MgCO <sub>3</sub> .....	
80% thru 100 mesh.....	3.00
All thru 10 mesh.....	2.50
80% thru 200 mesh.....	4.50
Paper bags, \$1.50 extra per ton; burlap, \$1.00 extra per ton.....	
Maxwell, Va.....	2.50
Ocala, Fla.—Analysis, 98% CaCO <sub>3</sub> —75% thru 200 mesh.....	4.50
<b>WESTERN:</b>	
Colton, Calif.—Analysis, 95% CaCO <sub>3</sub> , 3% MgCO <sub>3</sub> —all to pass 14 mesh; bags, 6.50; bulk.....	4.50
Sacks, 15c extra, returnable.....	
Garnett, Okla.—Analysis, 86% CaCO <sub>3</sub> , 50% thru 4 mesh.....	.50
Kansas City, Mo., Corriean Sidg—50% thru 100 mesh; bulk.....	1.80
Terminus, Calif.—Analysis, 96.2% CaCO <sub>3</sub> , 0.4% MgCO <sub>3</sub> —60% thru 200 mesh, 90% thru 100 mesh, 95% thru 50 mesh, 100% thru 4 mesh; sacks, 6.00; bulk.....	5.25
Tulsa, Okla.—90% thru 4 mesh.....	.50

## Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

<b>GLASS SAND:</b>	
Baltimore, Md.....	2.25@2.75
Berkley Springs, W. Va.....	2.00@2.25
Cedarville and South Vineland, N. J. (damp).....	1.75
Cheshire, Mass.....	5.00@7.00
Hancock, Md.—Damp.....	2.50@3.50
Klondike and Pacific, Mo.....	2.00@2.50
Mapleton, Pa.—Dry.....	2.50
Damp.....	2.00
Massillon, Ohio.....	3.00
Millington, Ill.....	1.75
Mineral Ridge, Ohio.....	2.50@2.75
Montoursville, Pa.—Green, washed.....	1.40@1.75
Oregon, Ill.—Large contracts.....	1.75
Ottawa, Ill.....	1.25@2.25
Pittsburgh, Pa.—Dry, 4.00; damp.....	3.00
Rockwood, Mich.....	3.00@3.50
Round Top, Md.—(washed-screened).....	1.25
St. Mary's, Pa.—Unwashed.....	2.25
Thayers, Pa.—Washed.....	2.00
Utica, Ill.....	1.25@1.75
Zanesville, Ohio.....	2.50

**FOUNDRY SAND:**

Albany, N. Y.—Sand blast.....	4.50@2.00
Molding fine, coarse and brass.....	1.75@2.00
Allentown, Pa.—Molding coarse & fine.....	1.50@1.75
Arenaville, Ill.—Molding fine.....	1.40@1.60
Beach City, O.—Core, washed and screened.....	2.00@2.50
Furnace lining.....	2.50@3.00
Molding fine and coarse.....	2.25@2.50
Bowmantown, Pa.—Core.....	1.35@1.50
Molding, coarse.....	1.80@2.00
Cleveland, O.—Molding coarse.....	1.50@2.00
Brass molding.....	1.50@2.00
Molding fine.....	1.50@2.25
Core.....	1.25@1.50
Columbus, O.—Core.....	.40@1.25
Sand blast.....	3.50@4.50
Furnace Lining.....	2.00
Molding fine.....	1.50@2.25
Molding coarse.....	1.50@2.25
Stone sawing.....	1.50
Traction.....	.40@.75
Brass molding.....	2.50

(Continued on next page)

## Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

## Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/4 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
<b>EASTERN:</b>						
Attica, N. Y.....	1.10	.95	.75	1.15	.85	1.25
Buffalo, N. Y.....	1.00	.75	.75	1.15	1.00	1.00
Erie, Pa.....	.48	.48	1.40	1.35	1.30	1.15
Farmingdale, N. J.....	.90	.90	1.25	1.15	1.15	1.15
Hartford, Conn.....	.50	.50	1.75	1.35	1.35	1.25
Leeds Junction, Me.....	.75*	.75*	1.70	1.50	1.50*	1.50*
Ludlow, Mass.....	.75	.75	1.40	1.25	1.25	.85
Philadelphia, Pa.....	1.30	1.30	1.30	1.35	1.35	1.35
Pittsburgh, Pa.....	.50	.50	1.00	1.40	1.50	1.20
Portland, Maine.....	.60@.75	.60@.75	2.00	1.40	1.20	1.20
Texas, Md.....						
Washington, D. C.....						
<b>CENTRAL:</b>						
Alton, Ill.....	.40	.40@.50	.90	1.00	1.00	.90
Anson, Wis.....	.90	.90	.70	.70	.70	.70
Attica and Covington, Ind.....	.60	.60	.60	.60	.60	.60
Barton, Wis.....	1.75@2.23	1.75@2.43	.90	.90	.90	.90
Beloit, Wis.....	.70	.65	.90	.90	.90	.90
Chicago, Ill.....	.90@1.25	.90@1.25	.85@1.25	.90@1.25	.90@1.25	.90@1.25
Cincinnati, Ohio.....	.40@.65	.40@.65	1.60	1.60	1.60	1.60
Columbus, Ohio.....	.65	.65	60-40 sieves, .85; Pebbles, .95	.95	.95	.95
Des Moines, Ia.....	.70	.70	1.00@1.25	1.00	1.00	1.00
Detroit, Mich.....	.50	.50	1.00@1.25	1.00	1.00	1.00
Earlestead (Flint), Mich.....	.80	.80	1.00	.80	.80	.80
Eau Claire, Wis.....	.70	.70	.90	.90	.72	.72
Elgin, Ill.....	1.22	1.22	2.17	.85	.75	.75
Elkhart Lake, Wis.....	.50	.50	.85	1.00	.85	.85
Ft. Dodge, Ia.....	.60	.60	1.50	.75@1.00	.75@1.00	.75@1.00
Grand Rapids, Mich.....	.65@.75	.65@.75	.65@.75	.65@.75	.65@.75	.65@.75
Greenville, Mechanicsburg, O.....	.70	.70	.80	1.00	1.00	1.00
Indianapolis, Ind.....	.90	.90	1.80	.70	.70	.70
Janesville, Wis.....	.50	.50	.75	.75	.75	.75
Le Mars, and Doon, Ia.....	.70	.70	.70	.70	.70	.70
Libertyville, Ill.....	.50	.50	.75	.75	.75	.75
Mankato, Minn.....	.90	.90	1.90	1.80	1.70	1.65
Mason City, Ia.....	1.15	1.15	1.25	1.25	1.25	1.25
Milwaukee, Wis.....	.35@.50	.35@.50	1.50	1.50	1.50	1.25@1.50
Minneapolis, Minn.....	.50@.70	.50@.70	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Moline, Ill.....	.40	.40	.60	.60	.60	.60
Oxford, Mich.....	.40	.40	.50	.50	.50	.50
Riton, Wis.....	1.20	1.35	1.50	1.30	1.25	1.25
St. Louis, Mo., f. o. b. cars.....	2.05	2.20	2.35	2.15	2.10	2.10
St. Louis, Mo., delivered on job.....	.75	.75	.75	.75	.75	.75
Summit Grove, Clinton, Ind.....	.75	.75	.90	.85	.85	.85
Terre Haute, Ind.....	.60	.60	1.50	1.25	1.25	1.25
Winona, Minn.....						
Yorkville, Morants, Oregon and Sheridan, Ill.....	.60@.80	.60@.80	.70@.80	.70@.80	.70@.80	.60@.80
<b>SOUTHERN:</b>						
Alexandria, La.....	1.48					1.20@1.50
Birmingham, Ala.....						
Charleston, W. Va.....	1.25	1.25	1.10	1.00	.90	.85
Estelle Springs, Tenn.....	.50@.60	.50@.60	.40@1.00	1.00	.50@1.00	.50@1.00
Ft. Worth, Tex.....	1.15	1.15	2.12	1.92	1.74	1.74
Jackson's Lake, Ala.....	.75	.75	.75	.75	.75	.75
Knoxville, Tenn.....	.50@.75	.50@.75	1.12	1.10	1.10	1.10
Lake Weir, Fla.....	1.10	1.10	1.10	1.10	1.10	1.10
Macon, Ga.....	1.12	1.12	1.10	1.10	1.10	1.10
Memphis, Tenn.....	1.10	1.10	1.10	1.10	1.10	1.10
N. Martinsville, W. Va.....	.50	.50	.50	.50	.50	.50
New Orleans, La.....	1.00@1.25	.80@1.05	1.00	1.00	1.00	1.00
Pine Bluff, Ark.....	.25	.25	.25	.25	.25	.25
Roseland, La.....						
<b>WESTERN:</b>						
Grand Rapids, Wyo.....	.50	.50	.85	.85	.80	.80
Kansas City, Mo.....	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)	1.00	1.00	1.00	1.00	1.00
Niles, Calif.....	1.10*	1.10*	1.10*	1.10*	1.10*	1.10*
Pueblo, Colo.....	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Diego, Calif.....	1.00	1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
San Francisco, Calif.....	1.50*	1.50*	2.00*	1.50*	1.50*	1.50*
Seattle, Wash.....						

## Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/4 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
Attica, Covington, Silverwood, Ind., and Palestine, Ill.....	.75	.75	.75	.75	.75	.75
Boonville, N. Y.....	.60@.80	.60@.80	.55@.75	.55@.75	.55@.75	.55@.75
Cape Girardeau, Mo.....						
Cherokee, Ia.....	1.10*	1.10*	1.05	1.00	1.00	1.00
Detroit, Mich.....						
Dudley, Ky. (Crushed Sand).....						
East Hartford, Conn.....						
Elkhart Lake, Wis.....	.60	.60	.65	.65	.65	.65
Estelle Springs, Tenn.....						
Fishers, N. Y.....						
Glenville, N. Y.....						
Hamilton, O.....						
Hartford, Conn.....						
Hersey, Mich.....	.30	.30	.50	.50	.50	.50
Indianapolis, Ind.....						
Janesville, Wis.....						
Lindsay, Tex.....						
Oxford, Mich.....						
Pine Bluff, Ark.....	.60@.75	.60@.75	.50@.65	.50@.65	.50@.65	.50@.65
Rochester, N. Y.....						
Roseland, La.....						
St. Louis, Mo., f. o. b. cars.....	.60	.60	.60	.60	.60	.60
Summit Grove, Ind.....						
Waco, Texas.....						
Winona, Minn.....						
Yardville, N. J.....	.50@.75	.50@.75	.50@.75	.50@.75	.50@.75	.50@.75
York, Pa.....	1.10@1.20	1.10@1.20	1.10@1.20	1.10@1.20	1.10@1.20	1.10@1.20

\*Cubic yard.

B Bank.

L Lake.

|| Ballast.

## Crushed Slag

City or shipping point	Roofing	¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
<b>EASTERN:</b>							
Allentown, Pa. ....	2.25	.90	1.50	1.00	1.00	1.00	1.00
Buffalo, N. Y. ....	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn. ....	3.50	1.10	2.50	1.25	1.25	1.25	1.25
<b>Eastern Pennsylvania and Northern New Jersey</b> .....	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Eric, Pa. ....	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa. ....	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Lebanon, Pa. ....	4.50	.85	1.50	.85	.85	.85	.85
<b>Sharpville and West Middlesex, Pa.</b> .....	2.00	1.30	1.70	1.30	1.30	1.30	1.30
<b>Western Pennsylvania</b> .....	2.50	1.25	1.25	1.25	1.25	1.25	1.25
<b>CENTRAL:</b>							
Chicago, Ill. ....		All sizes, \$1.50, F. O. B. Chicago					
Detroit, Mich. ....		All sizes, 1.65, F. O. B. Detroit					
Ironton, O. ....	2.40	1.75		1.35	1.35	1.35	1.35
Jackson, O. ....	2.00	1.35	1.70	1.35	1.35	1.35	1.35
Stuebenville, O. ....	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O. ....	2.93	2.30	2.49	2.49	2.49	2.30	2.30
<b>Youngstown, Dover, Hubbard, Leetonia, Struthers, Steubenville, Lowellville &amp; Canton, O.</b> .....	2.00	1.30	1.70	1.30	1.30	1.30	1.30
<b>SOUTHERN:</b>							
Alabama City, Ala. ....	2.05	.80	1.00@1.25	1.15	1.05@1.10	.85@1.00	.85@.90
Birmingham, Ala. ....	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala. ....	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton & Low Moor, Va. ....	2.50	1.00	1.25	1.25	1.25	1.15	1.05

## Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Bk. Bags	Lump Lime Bbl.
<b>EASTERN:</b>						
Adams, Mass. ....			11.50		8.00	
Bellefonte, Pa. ....			14.00			
Berkley, R. I. ....			11.00			
Buffalo, N. Y. ....		11.00		11.00		9.50 2.00*
Chaumont, N. Y. ....					2.50 4.00	
Mt. Union, Pa. ....					7.50	
Paxtang and Le Moyne, Pa. ....					5.00	5.00@7.50
Rockland, Maine ....					8.00	
Union Bridge, Md. ....			13.00		5.50	
West Rutland, Vt. ....					7.50	
West Stockbridge, Mass. ....			15.00			
Williams and Blue Bell, Pa. ....			11.25			
Williamsport, Pa. ....					10.00 10.00	6.00
York, Pa. ....		10.50	10.50	12.00		8.00 3.00
<b>CENTRAL:</b>						
Delaware, Ohio ....	10.50	9.00	8.00	9.50		8.00 1.60
Geneo, Ohio ....	10.50\$					
Gibsonburg, Ohio ....	10.50\$	8.50	8.50			7.00
Huntington, Ind. ....	10.50\$	9.00	8.50			8.00 1.70*
Knowles and Valders, Wis. ....			12.50		5.00 9.00	
Marblehead, Ohio ....		9.00	8.50			8.00 1.70*
Mitchell, Ind. ....		12.00	12.00	12.00		9.00 1.75*
Sheboygan, Wis. ....					5.50 8.50	
White Rock, Ohio ....	10.50					
Woodville, O. (dlrs.' price) ....	10.50a	9.00a	8.00a	9.00a	7.50 8.50	8.00 1.70
<b>SOUTHERN:</b>						
El Paso, Tex. ....						12.50
Knoxville, Tenn. ....	11.00	9.50	9.50		7.50	7.50 1.30
Sherwood, Tenn. ....	11.00	9.50	9.50	9.50	7.50	7.50 1.30
Staunton, Va. ....					8.00	9.50b 1.60
<b>WESTERN:</b>						
Colton, Calif. ....			15.00			
Kirtland, N. Mex. ....					12.00	12.50 2.00c
Los Angeles, Calif. ....			15.00†			16.00 2.15*
San Francisco, Calif. ....			19.50			13.00 2.00
Tehachapi, Calif. ....						16.00 2.15*

## Miscellaneous Sands

(Continued from preceding page)

Conneaut, O.—Molding fine .....	2.25@2.50
Molding coarse .....	2.00@2.25
Delaware, N. J.—Molding fine .....	2.00
Molding coarse .....	1.90
Brass Molding .....	2.15
Dresden, O.—Core and molding fine .....	1.25
Molding coarse .....	1.50
Brass molding .....	1.75
Dunbar, Pa.—Traction, damp .....	2.75
Traction, damp .....	2.75
Dundee and Chalfants, O.—Sand blast .....	3.00
Glass, core and traction .....	2.75
Molding fine and brass molding .....	2.25
Furnace lining .....	2.50
Molding coarse .....	2.00
Falls Creek, Pa.—Glass sand .....	2.50
Furnace lining, traction and molding coarse .....	2.00
Sand blast .....	3.50
Eau Claire, Wis.—Core .....	.75@1.25
Sand blast .....	3.00@4.25
Traction sand .....	.50
Franklin, Pa. and Utica, Pa.—Traction .....	2.50
Brass molding .....	2.25
Core .....	1.50@2.00
Molding fine .....	2.25
Molding coarse .....	2.25
Sand blast .....	5.00
Greenville, Ill.—Molding coarse .....	1.25@1.60
Howard, O.—Glass sand .....	3.00
Molding—Fine and coarse .....	1.75

Stone sawing .....	2.00
Core, roofing and brass molding .....	1.75@2.50
Sand blast, furnace lining and traction .....	2.50
Joliet, Ill.—Milled, dried and screened No. 2 coarse molding sand and open hearth loam and looting clay .....	.90@1.25
Kansas City, Mo.—Missouri River core .....	.80
Kasota, Minn.—Molding coarse and fine, stone sawing (pit run) .....	1.75
Klondike and Gray Summit, Mo.—Molding fine .....	2.00@2.50
Molding coarse .....	2.50@3.00
Mapleton, Pa.—Core, furnace lining, molding coarse and brass molding .....	2.00@2.75
Molding fine .....	2.25@2.75
Roofing sand .....	2.00@3.00
Sand blast .....	1.50@2.00
Glass sand .....	2.25@2.50
Massillon, O.—Glass sand, molding fine and coarse, core, and furnace lining .....	2.50@3.00
Traction .....	2.50
Michigan City, Ind.—Core, glass, traction and brass molding .....	.30@.40
Millington, Ill.—Glass, core, furnace lining, roofing and stone sawing .....	1.25@1.50
Banding sand .....	6.00
Mineral Ridge, Ohio—Core, furnace lining, molding fine and coarse, roofing, sand blast, stone sawing and traction (green) .....	2.00
Montoursville, Pa.—Core .....	1.25@1.50
Traction .....	1.00
Brass molding .....	1.40@1.50
New Lexington, O.—Molding fine .....	2.00

## Miscellaneous Sands

(Continued)

Molding coarse .....	1.75
Sand blast .....	3.00
Glass, core and traction .....	2.75
Furnace lining .....	2.50
Brass molding .....	2.25
Oregon, Ill.—Core and glass sand .....	2.00
Furnace lining .....	2.00
Molding fine and coarse .....	1.00
Sand blast .....	3.50
Ottawa, Ill.—Core, furnace lining, steel molding .....	1.50
Roofing sand .....	1.25@4.50
Sand blast .....	4.50
Ottawa, Minn.—Core .....	1.00@1.50
Glass, molding coarse, stone sawing (all crude silica) .....	1.00@1.50
Ridgeway, Pa.—Glass sand, green .....	2.25
Glass sand, wash .....	2.50
Molding, fine and coarse .....	1.20
Rockwood, Mich.—Core, damp .....	2.50
Roofing .....	3.00
Sand blast .....	3.50@3.75
San Francisco, Cal.—Glass and roofing .....	3.00@3.50
Core, molding fine and brass .....	2.30@2.60
Furnace lining and molding coarse .....	3.60@4.25
Coarse core sand .....	3.60@4.25
Sand blast .....	2.30@3.60
Stone sawing and traction .....	2.30
Thayer, Pa.—Traction .....	1.50
Furnace lining .....	1.25
Molding fine and coarse .....	1.25
Core—green .....	1.65
Utica, Pa.—Core .....	1.25@2.25
Molding fine and coarse, traction, brass molding .....	2.00
Williamstown junction, N. J.—Glass sand .....	2.80@2.90
Core, wet .....	2.50@2.60
Zanesville, Ohio—Molding fine and coarse, brass molding .....	1.50@2.00

## Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc .....	4.00
Cubes .....	45.00
Blanks, per lb. ....	.08
Chatsworth, Ga.—Crude talc .....	8.00@10.00
Ground talc (150-200 mesh), bags .....	12.50
Pencils and steel workers' crayons, per gross .....	1.50@2.00
Chester, Vt.—Ground talc (150-200 mesh) .....	9.00@10.50
(In Kraft paper bags, \$1.00 per ton less in burlap bags, plus 15c for each bag.)	
Emeryville, N. Y.—150-200 mesh; bags .....	14.00
Glendale, Calif.—Ground talc (150-200-mesh) .....	16.00@30.00
(Bags extra)	
Ground Talc (50-300 mesh) .....	13.50@15.50
Gouverneur, N. Y.—Ground talc (150-200 mesh) .....	13.50@14.50
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton .....	2.75@3.50
Ground talc (20-50 mesh), bags, 5.75@8.00; (200-350 mesh) bags .....	9.25@13.00
Johnson, Vt.—Ground talc (20-50 mesh), bulk .....	8.00
(Bags extra)	
Ground talc (150-200 mesh), bulk .....	10.00@15.00
(Bags extra)	
Keeler, Calif.—Ground talc (200 mesh), bags .....	16.62
(Bags extra)	
Los Angeles, Calif.—Crude talc, f. o. b. mine .....	10.00
Ground talc (150-200 mesh) .....	20.00
Silver talc dust (600-mesh) .....	50.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags .....	12.00@15.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk .....	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk .....	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags .....	8.00@10.00
Ground talc (150-200 mesh); bags .....	9.00@16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk .....	8.50
(Bags \$1.00 extra)	
Ground talc (150-200 mesh), bulk .....	10.00@15.00
(Bags \$1.50 extra)	
Pencils and steel workers' crayons, per gross .....	1.20@2.00

## Rock Phosphate

Raw Rock

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 72% to 75% .....	6.00@8.50
B.P.L. 65% .....	6.00
Gordonsburg, Tenn.—B.P.L. 68% to 72% .....	5.00@6.50
Mt. Pleasant, Tenn.—Analysis, .70 .....	
B.P.L. (2000 lbs.) .....	7.50
Montpelier, Idaho—70% B.P.L.—Crude .....	5.00
Crushed 2-in. ring and dried .....	6.00
Paris, Idaho—2,000 lb. mine run, B.P.L. 70% .....	4.00

(Continued on next page)

## Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed Franklin	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	\$ 9.30	\$8.40	\$8.10	\$7.80
24x11	9.30	8.40	8.10	7.80
22x12	10.80	8.70	8.40	9.10
22x11	10.80	8.70	8.40	9.10
20x12	10.80	8.70	8.40	9.10
20x10	11.70	9.00	8.70	8.40
18x10	11.70	9.00	8.70	8.40
18x9	11.70	9.00	8.70	8.40
16x10	11.70	8.40	8.40	8.10
16x9	11.70	8.40	8.40	8.10
18x12	11.10	8.70	8.40	8.10
16x12	11.10	8.70	8.40	8.10
14x10	11.10	8.40	8.10	7.80
14x8	11.10	8.40	8.10	7.80
14x7 to 12x6	9.60	8.40	8.10	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	\$ 8.10	\$7.50	\$7.20	\$5.75
22x11	8.40	7.80	7.50	5.75
Other sizes	8.70	8.10	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.  
Granulated slate per net ton f. o. b. quarries, Vermont and New York, 7.50

(Continued from preceding page)

## Ground Rock

Wales, Tenn.—B.P.L. 70%.....	7.75
Centerville, Tenn.—B.P.L. 60% to 65%.....	4.50@5.50
B.P.L. 75% (brown rock).....	12.00
Columbia, Tenn.—B.P.L. 68% to 72%.....	5.50
B.P.L. 65% (90% thru 200 mesh) bulk.....	5.50
Mt. Pleasant, Tenn.—B.P.L. 68%—13% Phosphorus.....	7.50@9.00
14% Phosphorus.....	8.00
B.P.L. 65@70%.....	7.00@9.00
Norwills, Fla.—(Fla. Hard Rock)—B.P.L. 68%.....	10.00

## Florida Soft Phosphate

## Raw Land Pebble

Per Ton	
Bartow and Norwills, Fla.—B.P.L. 50% bulk.....	6.00@8.00
B.P.L. 78% bulk.....	13.50
Jacksonville (Fla.) District.....	10.00@12.00

## Ground Land Pebble

Per Ton	
Jacksonville (Fla.) District.....	14.00
Add 2.50 for sacks.....	
Lakeland, Fla.—B.P.L. 60%.....	6.00
Morristown, Fla.—26% phos. acid.....	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.—6.00@7.00	

## Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.		
City or shipping point	Terrazzo	Stucco chips
Bound Brook, N. J.—Trap rock, carload lots; bulk.....		2.30
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries.....		17.50
Deerfield, Md.—Green; bulk.....	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble.....	16.00@20.00	11.00@17.00
Lincoln, Neb.—Red, white, grey, in bags.....		30.00
Middleboro, Mo.—Red granite; sacks.....	30.00@32.50	20.00@22.50
Milwaukee, Wis.—21.00@30.00		21.00@27.50
Missouri river points—Different colors.....	20.00@25.00	20.00@25.00
Piqua, O.—Marble.....	8.00@10.00	7.00@9.00
Sioux Falls and Red Granite, Wis.....	7.50	7.50

Tuckahoe, N. Y.—White marble.....	7.00@12.00	12.00
Crushed white stone and marble dust in 100 lb. bags.....	6.50@12.00	
Tate, Ga.—White limestone, sacks extra.....	5.00@7.00	5.00@7.00
Wausau, Wis.—14.00@18.00		
Wisconsin and S. Dak. points—Granite, different colors, bulk or sacks.....	1.50@2.00	3.00@7.00
Granite dust in bags.....	6.00	

## Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.....	18.00	26.00@38.00
Bellows Falls, Vt.....	18.00	
Birmingham, Ala.....	16.00	27.50@50.00
Bridgeport, Conn.....	31.00	32.00
Rochester, N. Y.....	21.00	
Eugene, Ore.....	25.00	45.00@60.00
Friesland, Wis.....	25.00	
Houston, Tex.....		21.00
Lockport, N. Y.....	17.00	
Omaha, Nebr.....	16.00	30.00@35.00
Piqua, O.....	15.00	25.00@50.00
Phoenix, Ariz.....	16.00	35.00@80.00
Portland, Ore.....	25.00	45.00@75.00
Puyallup, Wash.....	22.00	35.00@75.00
Rapid City, S. D.....	20.00	30.00@60.00
St. Paul, Minn.....	17.00	32.00@35.00
Salt Lake City, Utah.....	20.00	40.00
Salem, Ore.....	30.00	50.00@100.00
Seattle, Wash..... (select)	20.00	50.00@75.00
Springfield, Ill.....	18.00	20.00@25.00
Virden, Ill.....	18.00	20.00@22.00
Wauwatosa, Wis.....	14.00@15.00	30.00
Winnipeg, Man., Can.....	19.00	40.00

## Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.....	8.00
Barton, Wis.....	8.50
Bloomfield, Ont.....	16.00
Boston, Mass.....	12.00@13.00
Brighton, N. Y.....	14.25
Buffalo, N. Y.....	16.50
El Paso, Texas (Face 13.00).....	11.50@12.00
Gary, Ind.....	14.00
Grand Rapids, Mich.....	13.00
Lancaster, N. Y.....	13.50
Michigan City, Ind.....	10.00
Miller, Ind.....	10.00@10.50
Milwaukee, Wis. (delivered at job).....	13.00
Minneapolis, Minn.....	13.00
Plant City, Fla.....	10.00

Portage, Wis.—Common.....	15.00
Face.....	25.00
Redfield, Mass.....	15.00
Saginaw, Mich.....	11.50
San Antonio Texas—Common.....	14.00
Face.....	27.50
South Dayton, Ohio.....	14.50
Syracuse, N. Y. (delivered at job).....	18.00
F. o. b. cars.....	16.00
Toronto, Can.....	15.00
Washington, D. C.....	13.50
Winnipeg, Can.....	14.00

## Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton	Common
	Finishing	
Atlanta, Ga.....	19.00	16.00
Baltimore, Md.....	15.00	13.00
Boston, Mass.....	24.25	20.00
Cincinnati, Ohio.....	16.70	14.50
Chicago, Ill.....	20.00	
Dallas, Tex.....	25.00	
Denver, Colo.....	\$5.75	16.00
Detroit, Mich.....	15.75	13.75
Fort Dodge, Ia.....	19.70	17.00
Genoa, Ohio.....	10.50	
Grand Rapids, Mich.....	15.65	
Gypsum, Ohio.....	13.90	30.00
Los Angeles, Calif.....	29.00	22.00
Minneapolis, Minn.....	21.00	
Montreal, Que.....		17.25
New Orleans, La.....		16.99
New York, N. Y.....		16.70
Oakfield, N. Y.....		19.80
Plasterco, Va.....		24.00
St. Louis, Mo.....		25.40
San Francisco, Calif.....		24.00
Seattle, Wash.....		2.00

Lump per 180-lb. Barrel (net)

	Finishing	Common
Atlanta, Ga.....	2.00	1.60
Baltimore, Md.....		12.00
Boston, Mass.....	3.40	3.10
Cincinnati, Ohio.....		12.25
Chicago, Ill.....		1.65
Dallas, Tex.....		2.75
Denver, Colo.....	2.95	
Detroit, Mich.....	2.00	1.80
Los Angeles, Calif.....	3.00*	3.00*
Minneapolis, Minn.....		1.50
Montreal, Que.....	15.00†	
New Orleans, La.....		1.75
New York, N. Y.....		3.69*
St. Louis, Mo.....		1.65
San Francisco, Calif.....		2.25
Seattle, Wash.....	3.50	2.75

\*280-bbl. (net). †Per ton.

## Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga. (bags).....	3.45
Boston, Mass.....	2.86
Cedar Rapids, Ia.....	2.28
Cincinnati, Ohio.....	2.37
Cleveland, Ohio.....	2.28
Chicago, Ill.....	1.97
Dallas, Tex., incl. sacks 10c ea., 2.80; net.....	2.22
Davenport, Ia.....	2.90
Denver, Colo.....	2.31
Detroit, Mich.....	1.95
Duluth, Minn.....	2.23
Indianapolis, Ind.....	2.85
Kansas City, Mo. (includes sacks).....	3.31
Los Angeles, Calif.....	2.19
Milwaukee, Wis.....	2.26
Minneapolis, Minn.....	3.20
New Orleans, La.....	2.50
New York, N. Y. (includes bags).....	
(10c per bbl. discount in 10 days).....	2.02
Pittsburgh, Pa.....	2.25
St. Louis, Mo.....	3.09
San Francisco, Calif.....	
(Pkg. 15c on and off.).....	2.26
St. Paul, Minn.....	2.31
Toledo, Ohio.....	2.75
Seattle, Wash., f. o. b. factory.....	3.50
F. o. b. Seattle (including sacks).....	

NOTE—Add 40c per bbl. for bags.

## Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agri-cultural Gypsum	Stucco* and Calced Gypsum	Gauging Plaster	Wood Fiber	White\$ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board— 1/2x32x36" Weight 1500 lbs. Per M Sq. Ft.	Wallboard. 1/2x32x36" Weight 1850 lbs. Per M Sq. Ft.	Lengths 6'-10', 1850 lbs.
Alabaster, Mich.....	3.50	4.50											
Blue Rapids, Kan.....	3.50	4.50	7.50	9.00	11.00	11.50	11.00		23.75	20.00	19.375	20.00	36.75
Centerville, Iowa.....	3.50	4.50	7.50										
Douglas, Ariz.....		4.00				10.50@12.00a				10.50@11.50a			
*Eldorado, Okla.....				11.00	11.00				15.50		27.20	29.30	39.55
Fort Dodge, Ia.....	3.50	3.50	7.50	9.00@11.00	11.00	11.50	16.45@22.00		25.80	22.00	19.375	20.00	30.00
Garbutt, N. Y.....			7.50	9.00	11.00		19.50	7.50	27.25	22.00	19.375@25.00	20.00@26.25	30.00
Grand Rapids, Mich.....	3.50	4.50	7.50	9.00@12.00	11.00	11.00	20.25	8.00	27.95	20.00	19.375	20.00	30.00
Gypsum, Ohio.....	3.50			9.00	11.00								
Gypsumville, Man.....	3.50												
Hanover, Mont.....	5.00												
Loveland, Colo.....	3.50	4.50	7.50	9.00	11.00	11.50			29.80				
Oakfield, N. Y.....	3.50	4.50	7.50	9.00	11.00	11.00	21.20	7.50+	28.25	22.00	19.375	20.00	30.00
Piedmont, S. D.....			7.50	9.00	11.00	11.50			32.25		27.97	31.04	41.18
Plasterco, Va.....	4.50		7.00	9.00	11.00	11.00	21.90		29.90	20.00	21.375	22.00	
Rapid City, S. D.....	5.00												
Southard, Okla.....	3.50	4.50	7.50	9.00	11.00	11.50	11.00		15.50		26.20	28.70	39.40

NOTE—Returnable Jute Bags, 15c each, \$3.00 per ton; Paper Bags, \$1.00 per ton extra.  
\*Shipment in bulk 25c per ton less; †Acme, Tex., freight rates govern; ‡Bond Plaster \$1.50 per ton additional; +Sanded Wood Fiber \$2.50 per ton additional; ||White Moulding 50c per ton additional; ||Bulk; (a) Includes sacks.



## News—Continued

### New United States Suits to Break Alleged Cement "Trust"

**I**NJUNCTION SUITS to break an alleged cement monopoly, by which the government charges that prices have been fixed by cement manufacturers, were filed in the various district courts during the last week in October. These actions were started under the direction of the attorney-general of the United States.

The cement manufacturers' bureaus involved are the Midwest Cement Credit and Statistical Bureau, Chicago; Norcross Audit and Statistical Bureau, Kansas City; Cement Manufacturers' Protective Association, New York City; Southern Audit and Statistical Bureau, Dallas, Tex.

### Annual Meeting of American Road Builders' Association at New York

**T**HE annual meeting and dinner of the American Road Builders' Association will be held at the Automobile Club of America, New York, on Nov. 15. In the afternoon the officers will render their reports and in the evening the dinner will be held, after which the incoming president and other officers will be installed, followed by speeches by prominent members.

One of the important matters to be considered is the convention and good roads show to be held at the Coliseum, Chicago, on Jan. 16-20, 1922. The program committee is now preparing the program for the technical sessions. It is expected that by the selection of a comprehensive list of vital subjects to be discussed there will be a large attendance.

At last year's show there were over 140 exhibits and from present indications this number will be greatly increased at the coming show. In addition to the machinery and materials manufacturers who exhibited last year, many new firms are making applications for space, thus showing that more generally are manufacturers realizing the value of the show.

### California Marl Development

**T**HERE has recently been installed in Santa Clara County, California, an \$80,000 milling outfit, owned and operated by the Bernal Marl Fertilizer Co., which it is said will dig, crush and store about 300 tons per day. The Bernal Co. owns a 50,000,000-ton deposit of shell

marl suitable for soil treatment. This marl lime bed is in the hills below San Jose. The shells have become so soft that they crush to powder when handled—in fact, most of them have already been crushed to a solid, soft dry deposit that is dug out with a steam shovel and crushed fine in the mill.

The territory in this district was long ago granted to the Bernal family, who still control the hills in which the deposit lies. The Bernals have dug small quantities in years past for local sale and their analyses have shown approximately 90 per cent calcium carbonate, according to J. Dorman of the company, which is now developing the deposit in a commercial way.

### Crushed Rock for Railroad Crossings

**T**HE Chicago, Milwaukee and St. Paul Railway is making Postville, Iowa, a testing point in experimenting with the use of pulverized limestone as a substitute for planks at railroad crossings. The company at this time is tearing out planks on siding crossings and putting in their place pulverized lime rock from the Marquette (Iowa) Stone Products Co. The rock is in the same form as the pulverized limestone used for fertilizer on farms where soil has become acid. After the limestone is shoveled in between the rails at the crossings it is thoroughly tamped to make it firm. It is expected that eventually the pulverized rock will pack down and become almost as hard as concrete.

The company is confining the experimental work to siding crossing, leaving in the plank crossings on the main line until they have tested out the proposition. If it proves successful it is probable the company will substitute pulverized lime rock for plank at crossings on its entire system, according to reports.

### New Officers National Safety Council

**T**HE Executive Committee of the National Safety Council at its first meeting following the Tenth Annual Safety Congress elected the following vice-presidents for the National Safety Council:

David S. Beyer, Liberty Mutual Insurance Company, Boston, vice-president for service to members; B. F. Tillson, New Jersey Zinc Company, Franklin, N. J., vice-president for industrial safety; F. A. Davidson, Dwight P. Robinson Company,

New York City, vice-president for sectional activities; C. B. Scott, Bureau of Safety, Chicago, vice-president for local council; David Van Schaack, Aetna Life Insurance Company, Hartford, Conn., vice-president for public safety; W. E. Worth, Chicago Safety Council, secretary and treasurer.

W. H. Cameron, formerly secretary-treasurer of the National Workmen's Compensation Service Bureau, New York City, was elected executive secretary of the National Safety Council. Mr. Cameron, who on Nov. 1 will assume charge of the headquarters of the National Safety Council at Chicago, returns to a post which he held from the creation of the Council in 1912 to 1919.

Sidney J. Williams was re-elected Chief Engineer of the Council; C. W. Price, formerly general manager, will assist the National Safety Council as a special consultant in public safety.

### Potash Deposits in Texas

**B**ECAUSE of many inquiries concerning the potash deposits of Texas, Prof. J. A. Udden, director of the bureau of economic geology and technology of the University of Austin, Texas, has made a report on these deposits. He advises that, while there is evidence of potash in many parts of the state, development has not revealed that potash is present in commercial quantities. There is a possibility, however, of extensive potash deposits in the state.

### Shope Brick Co. Incorporated in Springfield, Mass.

**T**HE Shope Brick Co. of Springfield, Mass., has been incorporated, with a capital of \$125,000. The company will manufacture concrete brick and other building materials. Among the incorporators are Edward F. Seyler and Paul G. Seyler of Springfield, and William J. Kressler and Kenneth F. Kressler of Easton, Pa.

### World's Talc Production

**P**ROBABLY 90% of the talc mined is ground to flour and used in manufacturing paper, molded rubber goods and foundry facings. Only the highest grades can be used for toilet preparations and in medicine. Other uses for good-grade talc are in French chalk, soap and lubricants. It is also used as a filler in textiles, waterproof paints and gypsum wall plasters, and has a limited application as a polish for glass and leather.

# News of All the Industry

## Incorporations

The Feldspar Mines Corp., Ltd., Toronto, has been incorporated.

The Eagle Cement Corp., Jersey City, N. J., has been incorporated for \$150,000.

The Akka Cement Products Co. has been incorporated at New Kensington, Pa., for \$120,000 to \$140,000.

The Oakland Cement Co., Dallas, Tex., has been incorporated for \$8,000 by Chas. Halper, J. J. Madigan and W. H. Thompson.

The American Magestone Corp., Kansas City, Mo., has been incorporated for \$200,000. Samson & Griffith, Springfield, Ill., are the attorneys.

The Woodstown Press Brick Co., 417 Market Street, Camden, N. J., has been incorporated for \$100,000 and will manufacture brick and tile.

The Mineral Products Co., Portland, Me., has been incorporated for \$100,000. Officers are J. H. Pierce, president, and E. M. White, treasurer.

The Hermitage Portland Cement Co., New York, has been incorporated for \$3,000,000. The attorney is Corporation Trust Co. of America, Wilmington, Del.

The Crystalline Building Products Co. has been incorporated in Seattle, Wash., with a capital of \$50,000 by R. Tiede, D. Holtz, M. J. Reusz and R. P. Hoffman.

The Morristown Cement Block Co. has been incorporated at Morristown, N. Y., for \$100,000. The incorporators are H. Elder, E. Snook, Anna Snook and Lucy Elder.

The Eagle Cement Corporation, Jersey City, N. J., has been incorporated for \$100,000 to deal in cement. The incorporators are Harry C. Hand, Robert K. Thistle and A. Roy Myers.

The Chinese Merchants Brick and Lime Exchange, Shanghai, was organized by Hsia Tuan-kang recently, with a capital of \$1,000,000. The Ministry of Agriculture and Commerce has been petitioned for registration.

The Hudson Valley Portland Cement Corp., New York City, has been incorporated for \$100,000 and will engage in the manufacture of lime, cement, plaster, etc. The incorporator is H. W. Davey, 285 Barclay Street, Flushing, L. I., N. Y.

The Cement Tile & Products Co., Wilmington, Del., has been incorporated under state laws with a capital of \$100,000 to manufacture tile and affiliated products. The company is represented by the Colonial Charter Co., Ford Bldg., Wilmington.

The Federal Carbonic Gas Co., Jersey City, N. J., has been incorporated with a capital of \$500,000 to manufacture carbonic gas and other commercial gas products. The incorporators are Frank E. Taylor, Thomas J. Burke and R. Emmett Sullivan, 57 Randolph Avenue, Jersey City.

The Iotla Clay & Mica Co., Iotla, N. C., has been incorporated with a capital of \$50,000 to manufacture clay products, mica goods and kindred specialties. The incorporators are Herman A. Gudger, Asheville, N. C.; A. W. Mangum, Chapel Hill, N. C.; and Francis A. Gudger, 469 Fifth Avenue, New York, N. Y.

The Keystone Refractories Co., Minneapolis, Minn., has been incorporated with a capital of \$600,000 under Delaware laws to manufacture firebrick and other refractory products. The incorporators are H. B. Finch, W. K. Nash and C. R. Wilson, Minneapolis. The company is represented by the Delaware Registration Trust Co., 900 Market Street, Wilmington, Del.

## Quarries

The Hutchinson Co., Oakland, Calif., announces a cut of 10 cents a yard in the price of crushed rock.

The W. M. Dean Marble Co. of Columbia, Tenn., plans the erection of a new building the first of next year. W. M. Dean is president and manager.

The St. Francois Crushed Granite Co. near Laughboro, Mo., has been organized and will

develop granite deposits on the Belmont branch, three miles north of Laughboro. Crushed granite, dimension and paving blocks will be produced.

Wilson, Patterson and Gifford of Montreal, Que., who control the magnesite mines in Quebec, have made arrangements to sell the entire production to the Bishopric Manufacturing Co., Ltd., of Ottawa. This latter concern is making the magnesite into stucco known as "Firestone Stucco."

The New Jamestown Quarry Co., located near Spanish Lake, Mo., recently opened its plant. This is an incorporated organization of farmers controlled by a board of directors. More than 200 farmers inspected the new plant and saw how limestone rock is reduced to powder for agricultural purposes. G. R. Skinner, County Agent of St. Louis County, and C. L. Dietz of the Agricultural Extension Service gave short talks on the need and value of lime on sour soil. The plant is equipped with the latest machinery. It can supply crushed rock for road or concrete work as well as pulverized limestone for agricultural purposes.

F. W. Steadley and Company, Carthage, Mo., is reconstructing the section of its mill that was not destroyed by fire last April to conform with the new section. When completed, the entire building will be of stone and the machinery will be run in two distinct sections with separate power plants, so as to avoid trouble of a complete breakdown when either section is out of commission. The new half will have three rubbing beds, six polishing machines and five saw gangs. The two sections will be connected by a steel tramway 515 ft. long, operating with two traveling cranes, and under it a storage provision for from 400 to 500 blocks that will be kept constantly filled with surplus blocks. The pit is 55 by 110 ft. in dimensions, and blocks will be stored four deep. The remodeled plant when complete will have cost \$100,000 and will be one of the most complete and modern in the United States.

## Lime

The Ash Grove Lime and Portland Cement Co., Chanute, Kans., is resetting its battery of 10 Heine boilers.

The Gulf Sulphur Co. is reported to have acquired a site and will put in lime mills in Lime City, with postoffice at Oglesby, Tex.

Nelson, B. C.—A plant is to be erected at Nelson for the manufacture of lime sulphate. Limestone from the Nelson district will be used.

The Bathurst Co., Bathurst, N. B., are constructing two lime kilns on the wharf adjacent to its pulp and paper mills. The kilns will have a capacity of 25 to 35 tons per day. By constructing the kilns on the wharf all unnecessary labor in transportation will be eliminated and the rock will be shipped across the bay in scows and dumped into the kilns.

## Gypsum

The American Cement Plaster Co. have closed their office at Vancouver, B. C.

The Patton Cement Plaster Co., Rotan, Tex., is erecting an office building and later will erect a plaster plant costing \$350,000.

The Imperial Gypsum and Oil Co., San Diego, Calif., has begun construction on a main line and siding which it expects to have completed by January, 1922.

Kern County Gypsum Co., McKittrick, Calif., is displaying samples of its gypsum fertilizer at the Bakersfield Chamber of Commerce. Gypsum deposits are located near this oil town and are controlled and operated by this company. M. T. Davis is general manager.

The California Gypsum Corp. has leased 40 acres of tidelands at National City, Calif., and will erect two factories costing \$250,000 on this site. This company recently acquired the holdings of J. D. Fox and associates in the gypsum deposits west of Brawley. A railroad extension is to be built from Coyote Wells to the deposits.

## Feldspar

The Mt. Eagle Feldspar Co., Ltd., a Canadian corporation owning mining properties having large deposits of feldspar and fluor spar, has purchased the plant formerly occupied by the Meech Foundry Co., Cleveland, which it will convert for grinding these minerals. The plant will have a capacity of 150 tons a day. The company will also manufacture porcelain parts, especially those used in the electrical industry. J. O. Brown is president, M. B. Gordon, vice-president, and Curtis C. Burkett, secretary-treasurer.

## Cement

Eureka, Mont.—The Forks Portland Cement Co. will resume the manufacture of cement at both its Trident and Hanover plants before the spring.

The Great Western Portland Cement Co., Mildred, Kans., will soon start work on its new wet process cement plant, which will consist of a 10 ft. x 230 ft. kiln.

The Southwestern Portland Cement Plant at El Paso, Tex., has resumed work with about 225 men employed. It will take the company until next April to stock up to where it was when the plant was shut down last summer.

The Penn-Allen Cement Co., Allentown, Pa., has filed claim for \$55,030.59, and the Nazareth Cement Co. a claim of \$114,000 against the Pennsylvania Power and Light Co. as reparation which may be affected by pending protests against rates.

Redwood City, Calif.—Long abandoned oyster beds are about to be developed to supply a \$90,000 cement plant by peninsula capitalists, according to a local report. Scientists have discovered that there is a bed of shells three miles long, a mile wide and hundreds of feet deep.

The Copley Cement Co., Allentown, Pa., has announced a reduction of 5 cents an hour in the wages of its employees. This decrease brings the rate for common labor down to 25 cents an hour. The company will probably close its B mill and confine its production to mill C.

The Lehigh Portland Cement Co.'s plant at Iola, Kans., has resumed operation. The plant has been closed since July. This plant is one of the largest branches of the Lehigh Portland west of the Mississippi, employing 350 men and having a capacity of about 4,000 bbls. a day.

The Western States Portland Cement Co., Independence, Kans., has completed the construction of its new waste heat apparatus at Independence. Construction in its new plant at Davenport has been postponed for an indefinite period, according to a local report.

The Three Forks Portland Cement Co., Great Falls, Mont., announces that it will resume the manufacture of cement at both its Trident and Hanover plants. The plants closed last week and all stock on hand has since been consumed by the trade and construction anticipated next summer is expected to require the full output of the two mills.

Owen Sound, Ont.—Having been assured by Hon. T. C. Biggs, Minister of Public Works at Toronto, that the government would not erect a cement plant, immediate steps will be taken to erect a cement plant at Owen Island by private capital. The plant will have a capacity of 4,000 bbls. of cement per day. The proposed plant which will be a 4-unit one will draw supplies from Griffith's Island, about 15 miles from Owen Sound, where large quantities of limestone are available.

Porterville, Calif.—Plans are under way for the erection of a large cement plant in Porterville by combined eastern and western interests. Valuable shale deposits near the city have withstood every kind of test and have proven of exceptional quality for manufacturing cement. Details are being arranged by S. W. Woody of San Francisco. According to information received, Col. L. Hunt of the Hunt Engineering Co. of Kansas City, Mo., will personally superintend the construction of the plant.

The Henry Cowell Lime and Cement Co., Cowell, Calif., are considering plans for the construction of experimental concrete roads. The roads are to be built around the company property, where heavy trucking is done, and various types of concrete road construction are to be tried out. When the roads are finished, heavy trucks will be operated over the roads for the purpose of determining the type of construction which best withstands the heavy loads.

### Concrete Products

August Fredericks, cement manufacturer, has leased ground at Glendora, Calif., on which he will operate a cement plant, specializing in pipe and blocks.

The Phillips Concrete Pipe Yard at Escalon, Calif., has been purchased by F. Zurcher and E. B. Phillips, who have improved it so they are ready to file contracts for all sizes of pipe, underground gates, etc.

The Romanite Products Corp., Buffalo, N. Y., has been incorporated for \$500,000 and will engage in the manufacture of concrete products and tile. Incorporators are: R. M. Holser, E. A. Wilson and A. L. Klink. The attorney is A. Fybus, Buffalo.

The Cement Brick & Tile Co., Granville Island, Vancouver, B. C., are enjoying a steady expansion necessitating an enlargement of their plant. A storage shed for the better handling of the products in winter time is being built and other additions are planned.

August Fredericks, well known concrete products manufacturer and contractor, will erect a manufacturing plant at Glendora, Calif., specializing in concrete pipes and concrete blocks, to be used for a foundation of buildings of any kind, and which can also be used to construct the outer walls of either homes or business houses.

### Sand and Gravel

The Belmont Sand and Gravel Co. has opened offices in the Commercial Savings Bank Bldg. at Grand Rapids, Mich.

The Trenton Sand & Gravel Co., Trenton, Ohio, has closed its plant for an indefinite period, according to a local report.

R. Young and C. B. Denton of Newburg, Mo., have commenced construction of a \$10,000 gravel plant. Grading of the railroad tracks into the new plant is under way.

The Cape Henlopen Sand Co., Milford, Del., has been organized and is making preparations to have a track laid from the main railroad on Lewes Beach to the sand deposit.

The Northwestern Gravel Co., which operates a gravel plant at Lake View, Iowa, but has its headquarters in Des Moines, has located a gravel deposit on a tract of land near Quimby upon which it has taken an option.

The Kinzel-Thompson Sand & Gravel Co., Knoxville, Tenn., have launched its new gravel dredging craft, which is one of the largest ever constructed, on the Tennessee River. The new dredge will have a capacity of 2,500 tons daily.

The Reconstruction Stone and Building Co., Little Falls, N. J., has purchased the Canfield sand pit and started operation. The officers are: President, H. E. Mason; vice-president, W. V. Sheals; treasurer, J. L. Bahr of Verona; secretary, H. L. Hammond of Mountain View.

William Kennedy found a 20 ft. vein of gravel on a farm he recently purchased in Logan township, Ida county, Iowa. It is about four and one-half miles north of Ida Grove and will be easily accessible. Scarcity of gravel has been one of the handicaps to road improvement in Ida county.

### Manufacturers

The Besser Sales Co., Monadnock Bldg., Chicago, Ill., has just issued a catalog on the Besser automatic light-weight building tile machine. The catalog besides describing the machines goes into details regarding the adaptability of light-weight building tile to construction work. The book is now ready for distribution.

The Hardinge Co., New York City, has announced the following additions to its sales personnel: H. A. Kimber, formerly of the Quigley Furnace Specialties Co., is now in charge of sales of the Quigley pulverized coal department for the Hardinge Co. at 120 Broadway,

New York. L. W. Marso, in charge of the branch office of the Quigley Co., at Pittsburgh, will continue at the Pittsburgh office of the Hardinge Co. and specialize in the handling of the Quigley fuel systems. O. M. Rau, formerly consulting engineer of the Philadelphia Rapid Transit Co., is now associated with the Hardinge Co. in the New York office and will specialize on the boiler end of the Quigley fuel systems. W. O. Renkin, formerly managing engineer of the Quigley Co., is also associated with the Hardinge Co.

### Personal

E. B. Nichols has resigned as general superintendent of the National Lime and Stone Co., of Carey, Ohio.

W. J. Wolsey of Thetford Mines, Quebec, is going to Calaveras County, California, to build an asbestos mill for the Pacific Asbestos Co.

O. E. Wasson, formerly general superintendent of the Knickerbocker Portland Cement Co., Hudson, N. Y., has accepted a position with the Crescent Portland Cement Co., Wampum, Pa.

Col. Harry C. Boyden of the Portland Cement Association, addressed the Saskatchewan branch of the Engineering Institute of Canada at Regina, Sask., recently on "Recent Developments in Cement Construction."

Ben L. Whitney, formerly with the Byers Co., has opened an office at 528 Detroit Savings Bank Building, Detroit, and will represent the Orton & Steinbrenner Co., manufacturers of material-handling machinery, in that territory.

George B. Massey, formerly of the G. B. Massey Co., has joined forces with the newly incorporated Randolph-Perkins Co., engineers and managers, Chicago. Mr. Massey is a mechanical engineer specializing in excavating machinery and methods. He is at present making an extended investigation and report for American clients on projects in India.

### Obituary

George W. Bollenbacher, prominent stone operator and lifelong resident of Bloomington, Ind., died of heart disease. He was 72 years old.

## Canada Cement Co. Office Building

THE CANADA Cement Co., Ltd., Montreal, Que., is constructing a new building in Montreal which will serve as headquarters for the company besides being a general office building. The con-

cast-granite stone made by the Benedict Stone Corporation, and the south wall and courts will be lined with "hydro-stone" made by Canadian Hydro-Stone, Ltd.



New building of the Canada Cement Co., Ltd., Montreal, P. Q.

struction is being done by the George H. Fuller Co., Ltd.

The structure has a frontage of 120 ft. on Phillips Square and 165 ft. on both Phillips Place and Union Avenue. It will be ten stories high above ground, with basement and sub-basement floors, and there will be approximately 14,000 sq. ft. of rental area on each floor.

Concrete and reinforced concrete construction will be used throughout. The facades on Phillips Square, Union Avenue and Phillips Place will be of hand-tooled

Lighting conditions are unusually good, as there is unobstructed light from three streets. In the center of the building, and opening to the south, is a light court 26 ft. wide and 75 ft. deep. This plan permits of an exceptionally fine office layout, as typical offices with windows on the street are in no case more than 24 ft. deep, and those offices opening on the court are only 15 ft. deep.

The elevator service will consist of four gearless traction passenger elevators, with a speed of 600 ft. per min.



# Used Equipment

Rates for advertising in the Used Equipment Department: \$2.50 per column inch per insertion. Minimum charge, \$2.50. Please send check with your order. These ads must be paid in advance of insertion.

One 50-ton, standard gauge Baldwin Mogul; 170 lbs. pressure.

One 56-ton, standard gauge American 10-wheeler; 175 lbs. pressure.

Two 50-ton, standard gauge Brooks 6-wheel switchers; 160 lbs. pressure.

One 42-ton, standard gauge Shay geared locomotive.

One 24-ton, standard gauge Shay geared locomotive.

One 14-ton, 36" gauge American Saddle Tank.

Two 23-ton, brand new 36" gauge Porter 6-wheel switchers; separate tenders.

One Model 14-B Bucyrus Shovel.

The above are only a few items of our stock. Will gladly send you our complete stock lists.

**Birmingham Rail & Locomotive Co.**  
Birmingham, Ala.

## IMMEDIATE DELIVERY

**NO'S. 6, 7½, 9, 10 AND 18 CRUSHERS**

No. 10 McCULLY CRUSHER.  
50-75 HP. single drum 25 Cy. Motors.  
25-50-100 Kw. Eng. and Turbo Sets, Dir. Cur.  
250-500-500 Kw. Turbo and Eng. Sets.  
**BELT AND STEAM DRIVEN COMPRESSORS, 50-5000 ft.**

5-6-12 Ton 24-in. Gauge Gasoline Locomotives.  
Belt Driven Compressors, 50-5000 ft.

9-8-10-in. Sand Pump, belt drive.

25-40 HP. double drum Elec. Hoist, 440 V. 60 Cy.

5-10-15 Ton Holt Tractors.

2-290 HP. NEW B. & W. 200 lb. boilers steel casings.

150 HP. 125 lb. H. R. T. Boiler—Buttstrap, Indpls.

9K GATES REGULAR DRIVE, BARGAIN.

Send Us Your Inquiries Centrif. Pumps, Motors, Compressors and Electrical Equipment

**ROSS POWER EQUIP. CO.**

Indianapolis, Ind.

## DRYERS & CRUSHERS FOR SALE

3—Ruggles-Coles Type "A" Dryers.

1—Single Shell Dryer 6' 0" x 60' 0".

1—Traylor Jaw Crusher 10" x 16".

2—Traylor Roll Crushers.

Also Belt Conveyors, Screens and Elevators

**Hulbert A. Bond, Rowayton, Conn.**

## NO. 8-D, GATES GYRATORY CRUSHER STANDARD DRIVE

Fitted with manganese head and concaves. Included with this crusher, we have the following extra spare parts:

1 New, Manganese head.

1 New, set of manganese concaves.

1 New, main shaft.

1 New, Spider, and 2 New, eccentrics.

We also have many other sizes and types. We specialize in good quarry equipment of all classes. Write us fully.

**Reading Engineering Co., Inc.**  
1227 Tribune Bldg., New York, N. Y.

## FOR RENT AND SALE

13—6-yd. re-built dump cars, std. gauge.

20—12-yd. Westerns, like new, std. gauge.

50—60,000-lb. capacity flat and box cars.

1—Western standard gauge spreader.

1—Osgood 18 revolving shovel, traction wheels, No. 794, ¾-yd. bucket, used 8 mos.

1—Marion 36 combination shovel and drag-line, No. 4725, caterpillar traction, 1 ½-yd. bucket; used 4 mos.; built March, 1921.

1—Marion 76 steam shovel, No. 3503, std. gauge.

1—Marion 76 steam shovel, No. 3503, std. gauge.

## LOCOMOTIVES

2—32-ton Vulcan four-driver saddle-tank, used sixty days; built March, 1921.

1—40-ton 17x24 in. four-wheel switcher.

2—50-ton 18x24 in. six-wheel switchers.

2—NEW 25-ton six-wheel Porters, separate tenders, 36 in. gauge.

2—18, 14, and 10-ton Vulcans, 36 in. gauge.

Locomotive-Cranes, Railway Equipment, Etc.

**INDUSTRIAL EQUIPMENT CO.**

McCormick Building Chicago, Ill.

## EQUIPMENT BARGAINS

3-ton Plymouth 4' 8 ½" ga. Gasoline Locomotive.

7x12 cyl. 36 in. gauge Davenport Saddle Tank.

10—24 in. gauge 1 ½-yd. Western Dump Cars.

15—36 in. gauge 4 yd. Western Dump Cars.

3—16 yd. Western Air Dump Cars.

1—¾ yd. Thew "O" Traction Shovel.

**ZELNICKER IN ST. LOUIS**

"Everything for the Quarry"

## Machinery For Sale

**DRYERS**—Direct-heat rotary dryers, 3x25', 3½x25', 4x30', 5½x50' 6x50' and 7x60'; double shell dryers, 4x20', 5x30' and 6x35'; steam-heated air rotary dryers, 4x30' and 6x30'.

**KILNS**—Rotary kilns, 3½x25', 5x60' and 6x70', 6x100', 7x80' and 8x110'.

**MILLS**—6x8', 6x5', 2½x3' 3x3½' pebble and ball mills; 8x4', 6x4' and 4x4' continuous ball mills; 3' March mill; 42", 33" and 24" Fuller-Lehigh mills; 4½x20', 5x11', 5x20', 5½x22' and 6x20' tube mills; 7½x13", 9x15", 16x10" and 30x60" jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 36" and 40" cage mills; 3' and 4½" Hardinge mills; 18x12", 20x12" and 30x10" roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 3 roll and No. 000, No. 00 and No. 0 Raymond mills; one No. 5 Tel-smith breaker; one 36" Sturtevant emery mill; one 3 roll Griffin mill; 60" chaser mill.

**SPECIALS**—Five automatic package weighing machines; jigs; one Keystone excavator; 6x8', 6x5' and 4x3' Newayag vibrating screens, Richardson automatic scales.

Air compressors and tanks.

**W. P. Heineken, Engineer**  
95 Liberty Street, New York. Tel. Cortland 1841

## New Rubber Belting

300 ft. 12" 6-ply.....	\$0.99 per ft.
423 ft. 14" 5-ply.....	1.04 per ft.
527 ft. 14" 6-ply.....	1.25 per ft.
529 ft. 16" 6-ply.....	1.39 per ft.
520 ft. 16" 8-ply.....	1.90 per ft.
150 ft. 18" 6-ply.....	1.48 per ft.
512 ft. 18" 8-ply.....	2.00 per ft.

Rolls cut to any length.

**The National Belting & Salvage Co.**  
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## WANTED

Good used revolving screen about eight feet in diameter, and 30 feet long. Address

**JOHN H. ODENBACH**  
124 E. & B. Building Rochester, N. Y.

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

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## DRYERS

Having purchased 30 dryers 4'-0" dia. x 30'-0" long, with rollers, tires, gears, shafting, blowers, etc., we are prepared to offer them at a sacrifice before removal. Dryers are new and were never used. Furnace grates and doors or steam coils supplied. Write for price.

**McDermott Bros. Co.**  
Allentown, Pa.

## FOR SALE

40" PULLEY.  
40" face, 40" diameter. Straight face, double arm type. Brand new; never used. Bargain.

**MADISON COAL CORPORATION**  
910 S. Michigan Ave. Chicago, Ill.

## WANTED

1 4-yard, all-steel, bottom dump car.  
1 second-hand locomotive crane, capable of handling 3/4-yard dipper, with 40-foot boom.

**Evansville Sand & Gravel Co.**  
Evansville, Ind.

## FOR SALE

1 No. 18 Universal Crusher Company Pulverizer. Practically new, used less than one week. Rated capacity, 12 tons per hour through an 1/8" Screen. Large capacity through screens 1/4" to 1 1/2".

Above machinery in best condition, ready for use, and offered for sale, only because being replaced by machine of larger capacity.

Can be inspected at our plant at New Castle, Pa.

**UNIVERSAL SAND COMPANY**  
New Castle, Pa.

## FOR SALE

1 35 H.P. open case Bessemer Gas Engine fitted with HW Type electrical ignition. Practically new. Used less than two months.

Above machinery in best condition, ready for use, and offered for sale, only because being replaced by machine of larger capacity.

Can be inspected at our plant at Leesburg, Pa.

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All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

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Frick Building Pittsburgh, Pa.

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14 1 1/2-yard, side dump, all steel, 36" gauge tram cars.

12 1-yard, side dump, all steel 36" gauge tram cars.

2 American process dryers, 24' long by 48" diam., sprocket driven.

125 h.p., 16" by 24" steam engine.

6 h.p. F. & M. gasoline engine.

Worthington Steam pump 10" intake, 8" discharge, 20" cylinders, shop number 16876.

**E. W. COOPER**  
174 Third Ave., North Nashville, Tenn.

## FOR SALE

1—8 Mold, Type No. 500 American Clay Machinery Company Rotary Brick Press.

1—9 foot American Clay Machinery Company's Wet Grinding Pan.

The above are in excellent condition, located near New York, and I will sell same at attractive figures. Address

**Box 1511, Care of Rock Products**  
542 South Dearborn St. Chicago, Ill.

## WANTED

One (1) 5x22 Allis-Chalmers Wet Grinding Tube Mill.

**The Dolomite Products Company**  
1110 Euclid Ave. Cleveland, Ohio

## WANTED

2 end dump quarry cars, steel body 1 1/2 yd. 36".  
1 No. 2 Gates Gyratory Crusher.

Give complete description in first letter, also location.

**Wabash Stone Co., Geneva, Ind.**

*Take advantage of the*

# Used Equipment Pages of ROCK PRODUCTS

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—to help you sell what you no longer need

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Superintendent for crushed stone quarry in Texas, now operating. Unless you have had at least eight years' experience and can take complete charge do not answer. First class salary to man who can produce results. Address

Box 1514, Care of Rock Products  
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## WANTED

Superintendent for small lime manufacturing plant. Must be experienced and have thorough knowledge of quarrying and burning of lime. State experience, salary and references in first letter. Address

Box 1510, Care of Rock Products  
542 South Dearborn St., Chicago, Illinois

## FOR SALE

A first class Gypsum mine and plaster mill. Plant is well located and has been in business more than twenty years. A going concern which has been earning, during the past year of general business depression, over fifteen per cent on the price asked. Will give full information on being furnished proof of good faith and ability to handle the proposition. No agents. Address

Box 1508, Care of Rock Products  
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desires engagement, crushing plant; over 20 years' experience in heavy rock excavation; crushing plants; thoroughly experienced; steam shovel operations; expert blasting; efficient transportation; agricultural limestone plants; and efficient handling of labor; excellent references. Address

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to buy half-interest in well established limestone quarry located along main line railroad in Pennsylvania. Daily capacity 1000 tons. Modern crushing and lime plant. Anxious to develop pulverizing business. Here is a splendid opportunity for someone with cash. Address

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## WANTED

A position as manager or superintendent of lime plant. Am familiar with all methods of burning and hydrating, and can guarantee results as to economy and capacity. Having no encumbrance am willing to go any place. Can furnish good reference from last employer. Address

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Geo. B. Massey, Vice-Pres.  
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Costs Reduced

## We Design and Equip Complete Plants

for the manufacture of gypsum products, such as wall plaster, moulding plaster, wall board products, gypsum block products, also mixing plants.

We are prepared to furnish complete machinery-equipment and design and furnish plans for the installation. Consult our Engineering Department. Forty years' experience in designing of wall plaster machinery and plants.

### The J. B. Ehrsam & Sons Mfg. Co.

Engineers, Machinists and Founders  
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**AERIAL WIRE TRAMWAYS**  
Send for Illustrated Catalogue  
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Manufacturers of the

### Abbott Improved Crusher Feeder

Indispensable where clay or sticky material is mined.

We manufacture washing, crushing and drying machinery for phosphate and lime rock, suction and dipper dredges.

We contract for complete plants.



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Write us for full details of Mitchell success.

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## PORTER LOCOMOTIVES

For Every Purpose

**H. K. PORTER COMPANY**  
PITTSBURGH, PA.

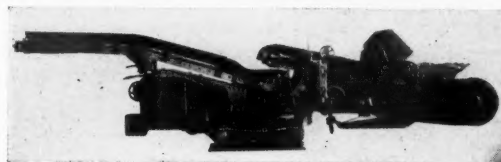
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**MYERS  
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Send for catalog

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When in the market for machinery or equipment, look through the advertisements of **ROCK PRODUCTS**. If you do not find what you want advertised in this issue, write us and we will put you in touch with reliable firms who can supply your need. This service is free to our readers. Use it.

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*Specializing in*  
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**\$300.00 and up**




Guaranteed to  
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Manufactured by

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**THE STANDARD OF EXCELLENCE**

**BALDWIN**  
Industrial and Contractors'  
**LOCOMOTIVES**

are in use where dependable motive power is  
required.

*Full information upon request*

**The Baldwin Locomotive Works**  
PHILADELPHIA

**SAUERMAN DRAGLINE CABLEWAY EXCAVATORS**  
dig, convey, elevate and dump in one operation



Cost data furnished by prominent gravel  
producers who are using Sauerman equip-  
ment backs up our claim that sand and  
gravel can be excavated and conveyed  
from pit to plant by one of our  
drag-line cableway excavators at  
a lower cost per ton than by  
using any other equipment or  
combination of equipment.

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**Sauerman Bros.**  
1140 Monadnock Bldg.  
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Also Mfrs. of Power Scrapers

**Automatic  
Aerial Tramway**



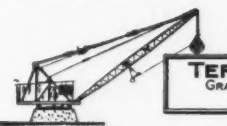
The Costs of  
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Maintenance  
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Justify its use  
at mine or  
quarry


**INTERSTATE EQUIPMENT CORP.**

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**TERRY** **FAMOUS  
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KEARNY, N. J.  
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GRAND CENTRAL TERMINAL  
NEW YORK CITY.



FULL CIRCLE CRANES. "EQUIPMENT THAT LASTS." TIMBER & STEEL DERRICKS.

LET US SOLVE YOUR MATERIAL HANDLING PROBLEMS.

All Types of  
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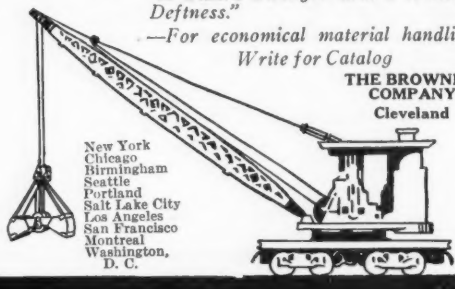
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"A Giant's Strength with a Wizard's Deftness."

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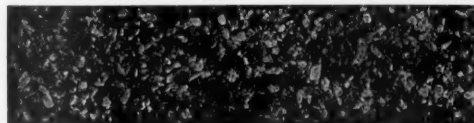
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BEAUTIFUL, ARTISTIC AND EVERLASTING

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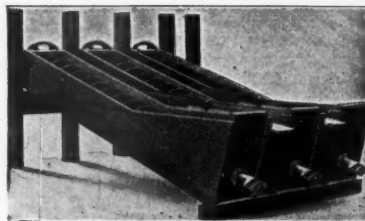


## Owen Buckets

combine dollar-saving features of bucket construction which are illustrated in our latest catalogue.

Write for it today.

THE OWEN BUCKET CO.  
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Sand Washers



9-Foot Dry Pan

## Lewistown Foundry & Machine Co.

LEWISTOWN, PA.

Builders of heavy duty crushers and glass sand machinery. Glass sand plants equipped complete.

Write for prices and catalog

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Ruggedly constructed cars of all types, and complete narrow-gauge railway equipment. May we mail you present and subsequent issues of "Quarry Car Practice"—a series of bulletins containing a costly collection of hundreds of photographs of quarries, car equipment and quarry haulage methods, showing car types that have made good and those that have failed.

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49 Dey Street, New York Works: Easton, Pa.  
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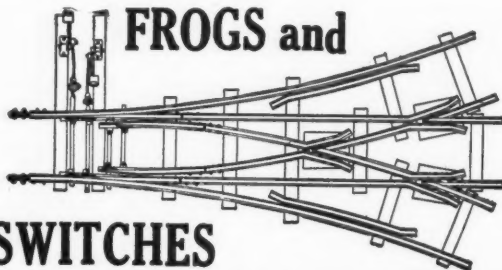
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CHICAGO, ILL.



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## SWITCHES

The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fishplates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.



## BYERS Cranes

Better than most makers think cranes need to be built—that's Byers Quality in a nutshell. Liberal use of steel and bronze; accurate, painstaking standards in machine-shop and erecting-room. Types and sizes to suit your work. Get Bulletins now.

The Byers Machine Co., 310 Sycamore St., Ravenna, Ohio  
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FIRST NATIONAL BANK BUILDING  
CHICAGO, U. S. A.

### CALDWELL Service



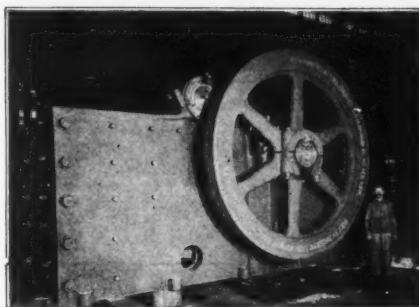
**H**ALF a million dollars worth of well selected stock, constantly maintained, and an organization keyed up to the theory that plant efficiency is measured by the number of orders shipped on the day of receipt, accounts for Caldwell service.



**H. W. Caldwell & Son Co.**  
LINK-BELT COMPANY, OWNER  
CHICAGO

17th Street and Western Avenue  
Dallas, Texas, 709 Main Street  
New York, 299 Broadway

### BUCHANAN JAW CRUSHERS ALL STEEL PATENTED



Side View—Type "C" Buchanan Box Frame, All Steel Jaw Crusher. Bulletin No. 10

Years of manufacturing experience, combined with an intimate knowledge of the conditions under which such machines operate, assures the purchaser of Buchanan Equipment machines of remarkable durability.

COMPLETE CRUSHING PLANTS

**C. G. BUCHANAN CO., Inc.**  
Cedar and West Streets New York City



### COMPLETE INSTALLATIONS For Stone Quarries or Lime Plants

We are prepared to build and superintend the installation of all equipment necessary to start operations.

Reliance Products are equal to the best and we know that our engineers can save you money by their recommendations. Prompt deliveries.

Let Us Quote You Prices

**Universal Road Machinery Co.**  
Kingston, N. Y.

Reliance Quarry and Road Building Equipment

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The idea of a trademark is coexistent with pride of craftsmanship; this means the use of the trademark is prehistoric. The significance of the trademark is the same throughout the ages—it means

### QUALITY!

A trademark would be a fatal identification to inferior products; it would be as a danger signal to the consumer.

The illustration shows the trademark by which DES MOINES products are identified and known, and prove their quality.

DES MOINES products include everything that can be made from structural steel and steel plates—buildings, bridges, viaducts, wireless towers, steel storage tanks for every purpose, riveted steel pipe, stills, penstocks, smoke-stacks and other material of like character.

Write for a catalogue, advising the material in which you are interested.

**Pittsburgh-Des Moines Steel Co.**

846 Curry Bldg., Pittsburgh, Pa.

**—DES MOINES—**



### Clam Shell Buckets at Bargain Prices

We are offering a limited number of "Type 'R' Clam Shell Buckets" in 1½ and 2 cu. yd. sizes for immediate shipment at the exceptionally low prices of—

**\$725.00** F. O. B. Bedford, for the 1½ cu. yd. Bucket, weighing 4250 pounds and

**\$850.00** F. O. B. Bedford, for the 2 cu. yd. Bucket, weighing 4975 pounds.

These buckets are of the flat link power wheel type and are of heavy substantial construction.

This type of bucket is especially adapted to the handling of coal, limestone, sand, gravel and other similar materials.

If you wish to purchase a superior bucket at the above prices you must act quickly.

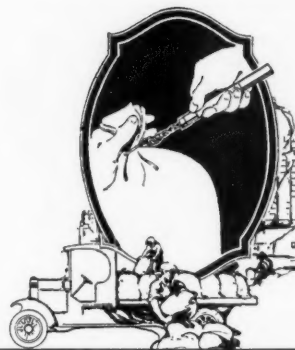
**THE McMYLER INTERSTATE CO., Cleveland, Ohio**

#### BRANCH OFFICES

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### Bates Wire Ties Now Sell at Less Than Pre-War Basis

Write for the new prices on Bates Wire Ties—they cost you less than string—actually priced lower than during the pre-war period.

If you are using the Bates System of Tying, stock up at the new prices.

If you haven't adopted the Bates System yet—

**Send for this FREE Trial Bag Tying Outfit**

The Bates FREE Trial Bag Tying Outfit, containing one Bates Spring Return Tying Tool and 20 each of 4, 4½, 5, 5½ and 6 inch Bates Wire Ties, will be sent you on receipt of your signed agreement to try this Bag Tying Outfit on your work, and then within 15 days, send \$2.50 for the outfit or return the tool to us.

These trial ties cost you NOTHING.

**BATES VALVE BAG COMPANY**

7326 South Chicago Ave.  
Chicago, Ill.

110 Great Portland St.  
London, W. I., England



### Universal Crushers

The biggest value for your money. Universal crushers and pulverizers reduce stone to desired size or fineness in a jiffy! Fifteen years of designing and building experience have made possible the exceptional ability of Universals.

**Universal Crusher Co.**

225 Third Street  
Cedar Rapids, Iowa, U.S.A.





2 1/2 TON FRICTION DRIVE GASOLINE LOCOMOTIVE  
GEAR AND FRICTION DRIVEN  
GASOLINE LOCOMOTIVES—2 1/2  
TO 25 TONS ON DRIVE WHEEL

## WHITCOMB LOCOMOTIVES

IT WILL PAY YOU TO GET OUR  
PROPOSITION BEFORE YOU BUY

**GEO. D. WHITCOMB Co.**

MAIN OFFICE AND WORKS

**ROCHELLE, ILLINOIS  
U. S. A.**



5 TON FRICTION DRIVE GASOLINE LOCOMOTIVE  
STORAGE BATTERY LOCOMO-  
TIVES—1 TO 8 TONS ON  
DRIVE WHEELS

## THE GAYCO-EMERICK CENTRIFUGAL AIR SEPARATOR

The first radical improvement in fine  
separation in a century

A principle which makes obsolete all  
other separating methods

**60 mesh to 350 mesh**

For limestone, coal, clay, silica, talc, graphite  
and all other dry ground materials

Increases B. P. L. content of Phosphate Rock

Write for Bulletin C

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114 Liberty St. New York, N. Y.

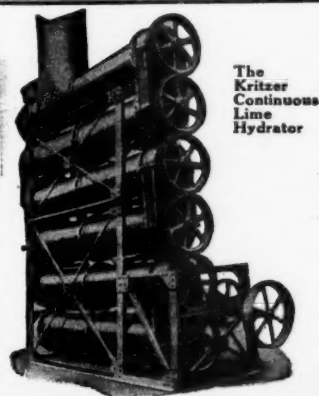
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### Economy

McGinty Grates are economical in  
operation because they withstand a  
higher degree of heat without warp-  
ing than any other grate, and be-  
cause of the greater air area you are  
able to burn low grade coal.

It is a shaking, sifting and dump-  
ing grate—and the fires can be  
cleaned with closed doors.

**The Kramer Bros. Foundry Co.**  
Dayton, Ohio



The  
Kritzer  
Continuous  
Lime  
Hydrator

## HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

*A KRITZER plant, scientifically adapted to your con-  
ditions, will give you the best product at lowest cost*

**THE KRITZER COMPANY**  
503 South Jefferson Street CHICAGO, ILL.





## PERFORATED STEEL SCREENS

The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge, and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

Try us with your next order.

**Cross Engineering Company, Offices and Works, Carbondale, Pennsylvania**

## INTERNATIONAL BARRELS

*are without equal for quality, strength and durability*

They are the best containers used in the Lime, Cement and Plaster Trades.

Our several branch shops permit quick deliveries of these QUALITY BARRELS to your plant, wherever it is located.

Samples and prices  
sent on request

**International Cooperage Co., Inc.**  
Niagara Falls, N. Y.

THE  
ONLY  
TRUE  
BASIS  
OF



### COMPARISON BETWEEN CRUSHERS

is that of cost per ton of output over a long period of time.

First cost, operating expenses, production figures—each means nothing by itself. What counts is LAST COST, and that can only be expressed as the average cost to produce a ton of crushed stone.

Judge Austin Gyratory Crushers on any basis you choose, and they make a fine showing; but it is on the Last Cost basis that these crushers should really be judged, for then the exclusive Austin features which increase production and reduce expense make themselves felt unmistakably.

Catalog No. 28-T illustrates and describes crushers, elevators, screens, etc.

WRITE FOR YOUR COPY TODAY

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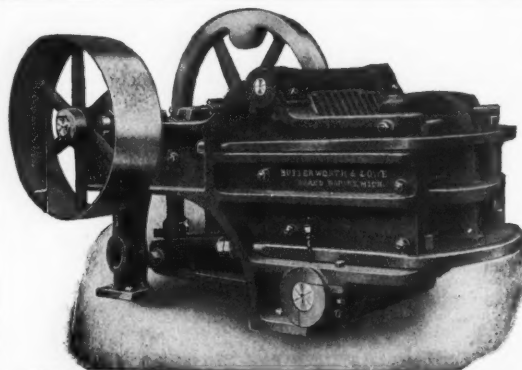
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Canadian Agents:

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ALLIED MACHINERY COMPANY OF AMERICA  
21 Chambers St., New York City, U.S.A.



Nippers—17x19", 18x26", 20x30", 24x36" and 26x42"

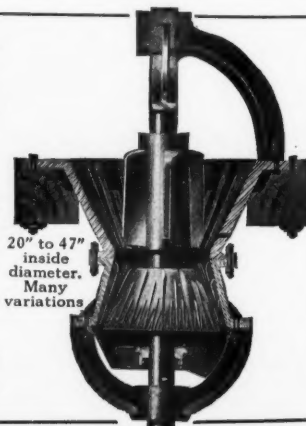
## JAW & ROTARY CRUSHERS

For All Rocks and Ores  
Softer Than Granite

GYPSUM MACHINERY—We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

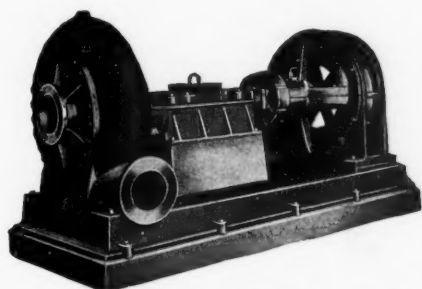
Special Crusher-Grinders for Lime

**Butterworth & Lowe**  
17 Huron St. Grand Rapids, Mich.



20" to 47"  
inside  
diameter.  
Many  
variations

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## Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4" up, arranged for belt, motor, or engine drive.

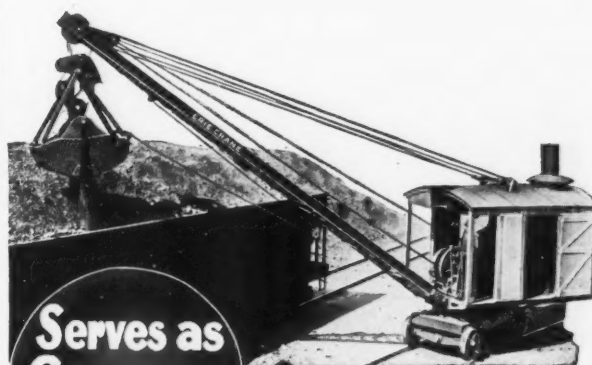
### Morris Machine Works Baldwinsville, N. Y.

39 Cortlandt Street, New York City  
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Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

# Morris

Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines



**Serves as  
Crane or  
Steam Shovel**

Every ERIE can be quickly and easily changed over to a Locomotive Crane. Gives excellent service with clamshell bucket — excavates gravel, loads cars, handles storage, etc.

In the hardest steam shovel service, gravel producers and quarrymen have found the ERIE very sturdy and reliable. "Our first ERIE has been digging hard gravel for 3 years without any repairs. We have in the past operated other steam shovels that are good, but the ERIE is the best, being by far the most substantial." — write the Standard Builders' Supply Co., Grand Rapids, Mich. They own 2 ERIES, a Steam Shovel, and a Crane.

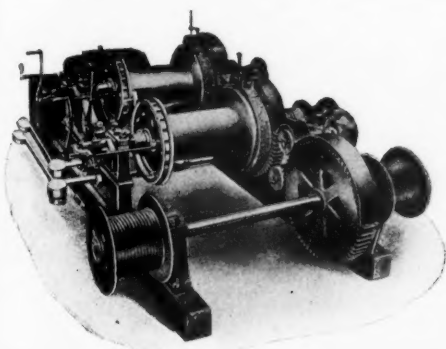
We will be glad to send you a bulletin showing just what you can do with the ERIE, both as crane and steam shovel. Write for Bulletin P-16.



**BALL ENGINE CO., Erie, Pa., U. S. A.**  
Builders of ERIE Steam Shovels and Locomotive Cranes

# ERIE

**Revolving  
Shovels**



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Double Drum with swinging gear, A.C. or D.C., 10-75 H.P.  
One of the many standard types illustrated in the Flory Catalog.

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Screening, Sizing, Air Separating, Mixing,  
Weighing, Elevating and Conveying Machinery  
Complete Units    :-    :-    Engineering Service*

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with  
**OSGOOD**



REVOLVING AND RAILROAD TYPE STEAM SHOVELS— $\frac{3}{4}$ -6 CU. YDS.  
**THE OSGOOD COMPANY, MARION, OHIO, U. S. A.**



Stucco Buildings, Concrete Blocks or Bricks faced with Metro-Nite are beautiful, artistic and everlasting.

Metro-Nite White is of a crystalline character, really a siliceous dolomite. It is extremely hard, sharp and cleanly graded, making a bright, sparkling face.

Free samples mailed on request.

Two colors—White and Green.

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## GREENSTONE

Is the one lasting ornament for surfacing Stucco. The natural olive-green color blends in harmony with Nature's color scheme, and age only tends to deepen the shade. The pure white back-ground of stucco, dashed with our No. 48 product, gives you a finish of unequalled beauty and durability.

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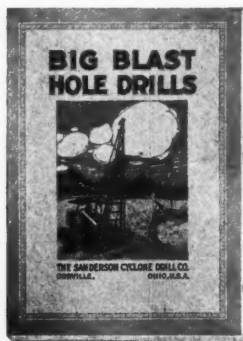
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Prices on Application

**Greenstone Products Company, Inc.**

Mills: Deerfield, Md.

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## Analyze Your Drilling and Blasting

Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

Drilling, being the first step in stone production, is the most important. One cent or one-half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right.

**THE SANDERSON-CYCLONE DRILL CO.**

Orrville, Ohio

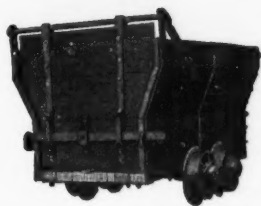
Eastern and Export Office, 30 Church St., New York



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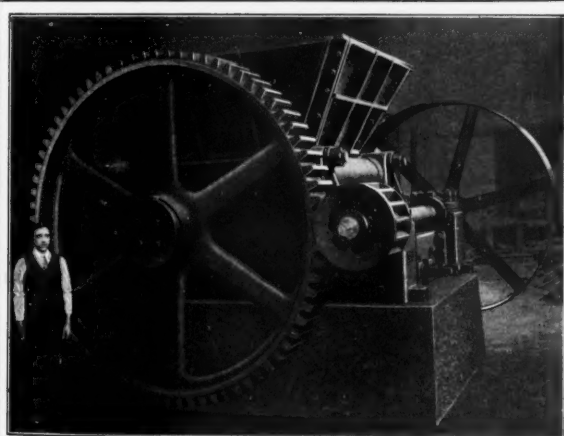


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Write today for catalog

**The Watt Mining Car Wheel Co.**  
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If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

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Screens, Elevators, Conveyors, Rock Washers, Etc.

## CENTRIFUGAL PUMPS FOR ROCK PRODUCTS INDUSTRIES



### A GENERALLY CONCEDED ECONOMY

is the removal of dirt and gravel from any hillside quarry where there is a water supply available by the hydraulic stripping method.

This method is particularly successful when Allis-Chalmers centrifugal pumps are used for furnishing the water in any required amount and at the necessary pressure.

“—The pressure developed at the nozzle is even greater than the specifications call for and we assure you we are satisfied with the installation in every way.—”

This is a typical comment from a satisfied purchaser of an Allis-Chalmers Combined Centrifugal Pumping Unit which we can furnish for many pumping purposes around the quarry.

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ELECTRICAL MACHINERY  
STEAM TURBINES — STEAM ENGINES  
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GAS ENGINES — OIL ENGINES  
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PUMPING ENGINES  
CENTRIFUGAL PUMPS  
CONDENSERS  
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## The Clyde Lime Hydrator Performance Counts

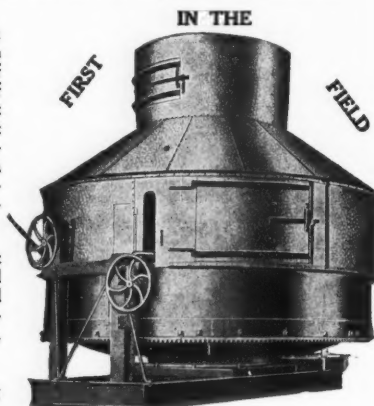
The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

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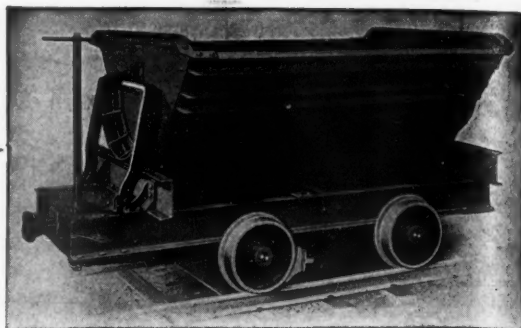


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## More Than Reinforced

Reinforcing a dump car makes it stronger, of course. But there is a best way to reinforce. Atlas cars are reinforced the best way. Why? Simply because we have built dump cars so long and for so many people that we know just where the reinforcing should go and just how it should be done.

Not much wonder, then, that Atlas dump cars stand the "gaff" better than the average.

**The Atlas Car & Manufacturing Co.**  
ENGINEERS MANUFACTURERS  
CLEVELAND, OHIO, U. S. A.

## Here is the Solution to Your Fine Grinding Problem

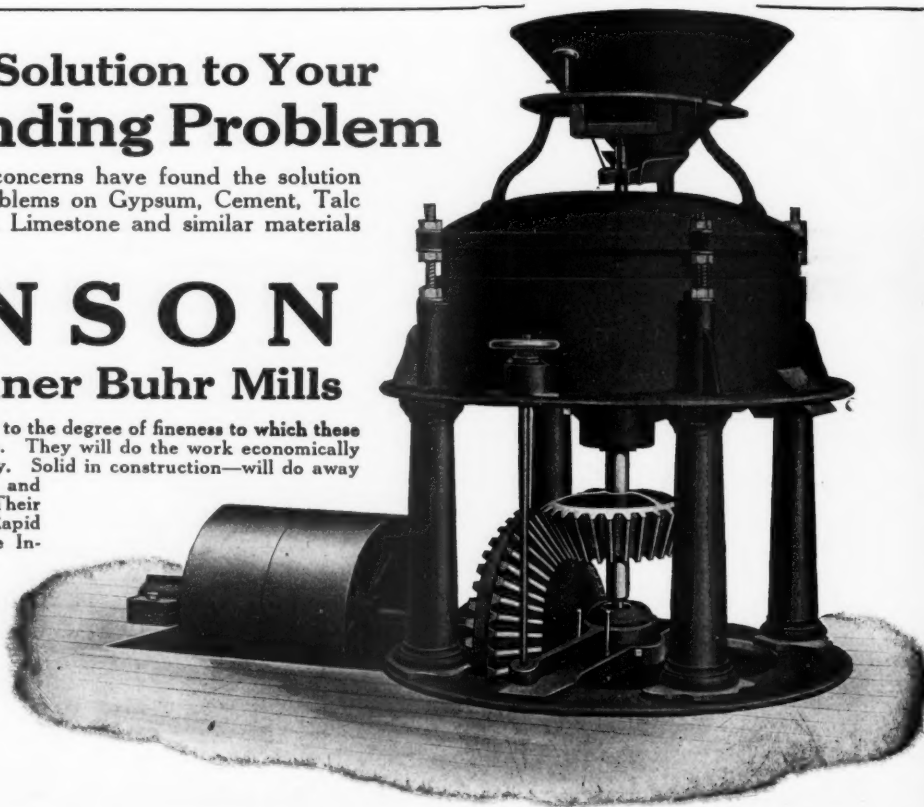
Many of the leading concerns have found the solution to their fine grinding problems on Gypsum, Cement, Talc and Soapstone, Graphite, Limestone and similar materials by installing

## MUNSON Under Runner Buhr Mills

There is practically no limit to the degree of fineness to which these mills will grind these products. They will do the work economically and satisfactorily in every way. Solid in construction—will do away with delays and shut-down and keep out of the repair shop. Their Automatic Adjustment, Rapid Grinding and Perfect Balance insure good results and fine and uniform grinding.

Why not investigate? Send for our new catalog, number 71.

**Munson Mill  
Machinery Co., Inc.**  
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## PRODUCTS

Heavy Gearing and Friction Clutches for paper-mills, rubber-mills, tube-mills, cement-mills, rolling-mills, stone quarries, and rock products, mining and coal-handling machinery, elevators and malt houses, turbines and water wheels, sugar refineries, packing houses, electric light plants, powder-mills, glass factories; cut gears and machine molded gears of all kinds.

Shafting, pulleys, hangers, couplings, collars, pillow blocks, worm-wheels, fly-wheels, and rope sheaves.

Makers of grey iron, and semisteel castings by analysis.

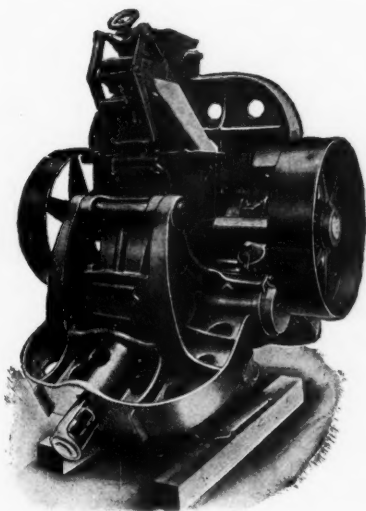
Special machinery built to order on modern tools at usual shop rates.

## A. PLAMONDON MANUFACTURING CO.

Engineers, Founders, and Machinists

Established 1859 — Incorporated 1877

Works and Main Office: 5301 South Western Boulevard, Chicago, Illinois  
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## MAXECON MILL

### Preliminary Grinder for Tube Mills

LIMESTONE .....	20 to 40 Mesh
CEMENT CLINKER .....	20 to 60 Mesh

### MAXECON MILL PERFECTECON SEPARATOR

The UNIT that has LARGER  
OUTPUT with LESS POWER  
WEAR and ATTENTION than  
any other.

It will be to the interest of those who operate CEMENT  
PLANTS to know what the Maxecon Unit will do.

Drop us a line

We will be glad to tell you about it

## Kent Mill Company

10 Rapelyea Street

BROOKLYN, N. Y.



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# In Buying Blast Hole Drills

DON'T buy the kind of machine that others have used and discarded!


DON'T buy a machine that the greatest Quarry Engineers of the country have condemned after severe scientific tests.

BUT—buy the Drill that takes the first place under all conditions!

 BUY the "CLIPPER"! The most satisfactory Blast Hole Drill in the world!

Visit the "Big" Quarries in the eastern half of the United States and see what they use!

Then write to us or come and see us and get information that will put you on the right track. Many big quarries are saving thousands of dollars annually because they took and are taking our advice about Blast Hole Drilling matters!

 If you make a mistake you have nobody to blame but yourself.

**The Loomis Machine Company, Tiffin, Ohio**

## BUCYRUS

### POWER, CAPACITY, RUGGEDNESS



The combination of these three elements has made possible the splendid records for efficiency held by Bucyrus Railroad Type Shovels.

They are built in sizes to meet every requirement

New York  
Chicago  
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## BUCYRUS COMPANY

SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Richmond, Va.  
Denver  
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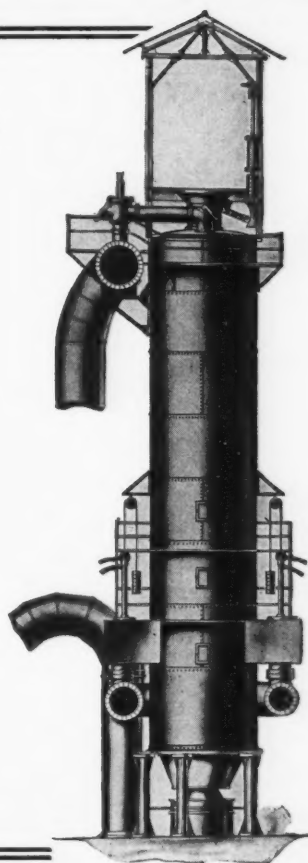
## Continuous Discharge—Gas Fired LIME KILNS

The wastefulness or efficiency of any lime burning apparatus is determined by the amount of fuel per ton of lime produced.

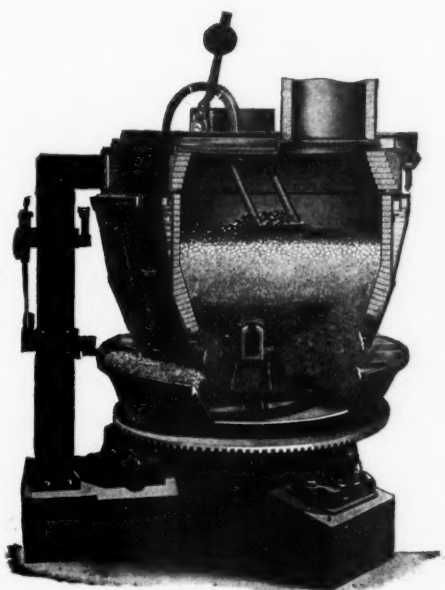
Our Kilns are not an experiment, but have successfully met the test of years of actual service. The design is the work of our Consulting Mechanical and Chemical Engineer, who has had many years of practical operative experience. They embody a number of labor saving devices, and are designed to secure maximum production with minimum fuel consumption; their record in this respect should interest every lime producer in the country.

**Glamorgan Pipe & Foundry Company**  
Lynchburg, Va., U. S. A.

Using the Nationally Famous Virginia Foundry Irons



## The Machine of Absolute Satisfaction



Selected by every large purchaser in the steel industry since the armistice. Three recent installations at leading Eastern Lime Plants.

### POKERLESS PRODUCER-GAS MACHINE

Users everywhere testify with one voice to the superior satisfaction and low maintenance expense of this splendid machine. Difference in first cost comes back annually; every detail built for endurance.

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Worcester, Mass.

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Telephone Court 1381

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(Continued on page 68)





A radical departure in Screens

## **The Simplex Screen**

Gravitation Principle—Wullstein Patents

No Cross Wires  
No Openings with Closed Ends  
Constantly Increasing Space  
Between All Teeth

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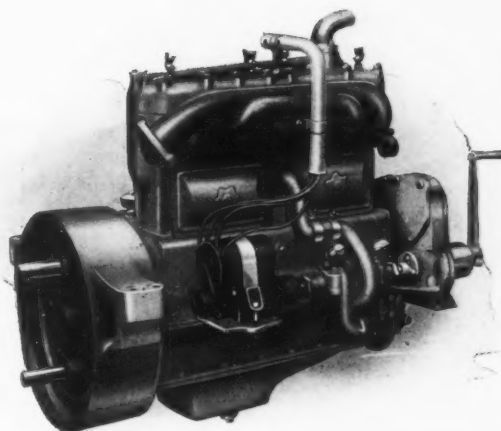
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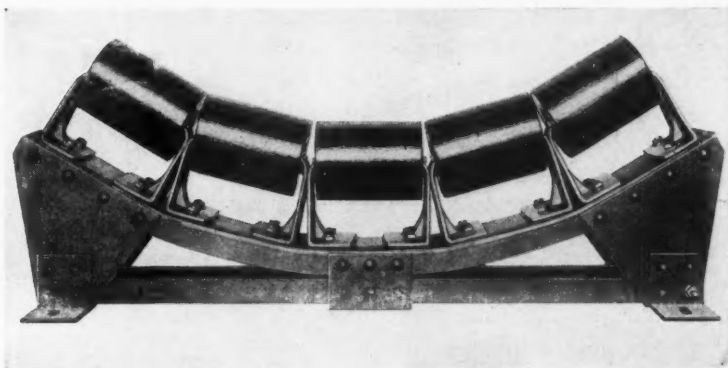
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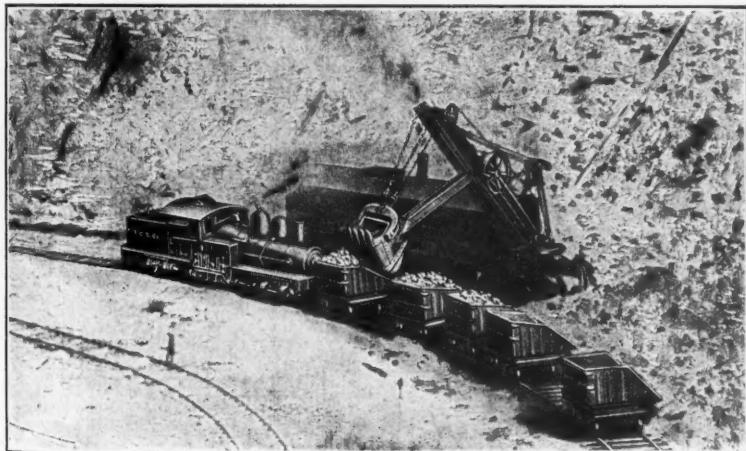


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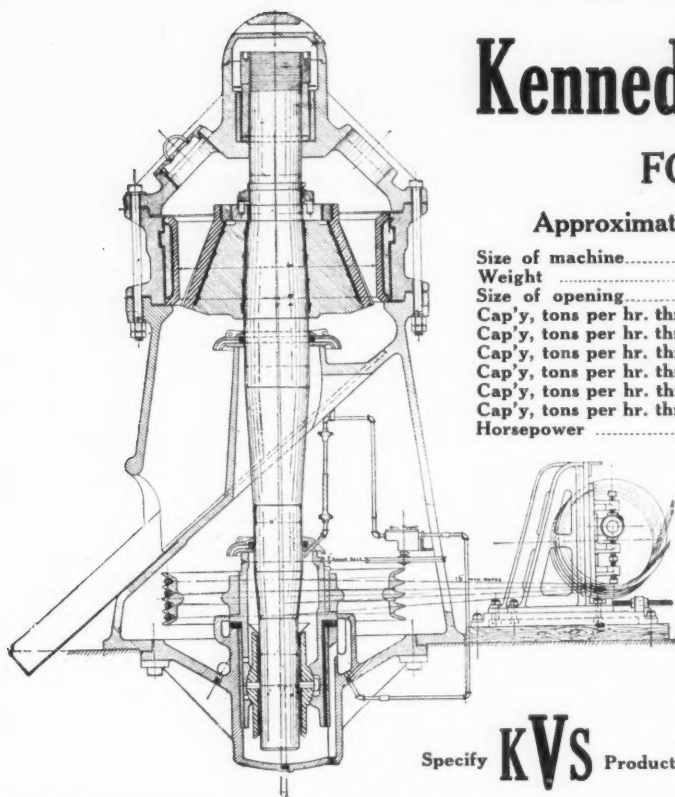
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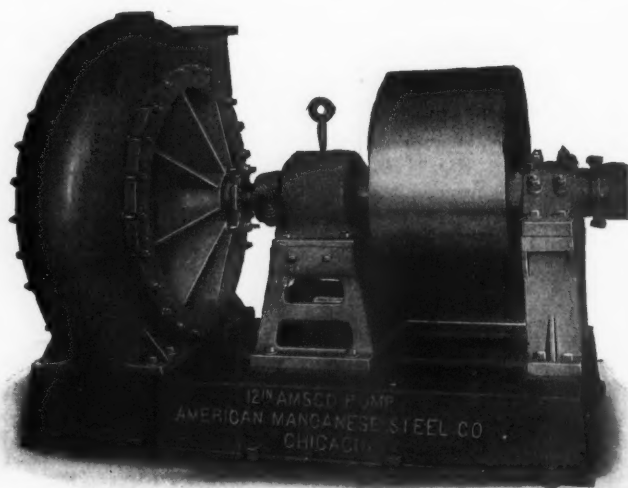
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